

# PEDESTRIAN POLICIES AND DESIGN GUIDELINES 2005



Maricopa Association of Governments



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# MARICOPA ASSOCIATION OF GOVERNMENTS

## Pedestrian Policies and Design Guidelines

April 2005



# ACKNOWLEDGEMENTS

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## INTRODUCTION

Pedestrians are an integral part of any transportation system. Any driver becomes a pedestrian the moment he or she leaves a vehicle or bicycle. Public transportation users are pedestrians when they walk to the public transit stop and again when they walk to their destination. If the entire transportation system is to function efficiently, we must plan for the needs and expectations of people who walk. This publication is intended to make the places we walk safer, more comfortable, and more desirable as destinations.

According to *Mean Streets 2004*, a Surface Transportation Policy Project, the city of Phoenix has the tenth highest pedestrian danger index (PDI), 117.2. The PDI compares the annual rate of pedestrian deaths relative to the number

of people who walk in a community. This high score is attributed to sprawling, low-density development connected by high speed arterials. However, this number is down 12 percent from the 1994-1995 PDI. The 2004 report states that 4,827 people died in 2003 while walking down the street, down from 4,919 in 2002. In each of these same two years, there were 70,000 injuries. In Arizona, there were 156 fatalities in 2002, and 125 in 2003, an average annual rate per 100,000 residents of 2.55 percent. However, spending on pedestrian projects is not commensurate with the apparent need. Says *Mean Streets 2004*, "Nationally, less than one percent of federal transportation funds have so far been spent on pedestrian facilities".

## BACKGROUND

The Maricopa Association of Governments (MAG) Regional Council formed the Pedestrian Working Group in 1993 to educate the region about pedestrian issues, and to promote the development of facilities for people to walk. The Working Group consists of MAG members, and representatives of the planning, architecture, landscape architecture, and development communities.



*A pedestrian gathering area.*

### What is a Pedestrian Facility?

- **a sidewalk**
- **a path or trail**
- **a crosswalk/mid-block crossing**
- **a traffic calming feature**
- **an under and overpass/grade separation**
- **a wide shoulder**
- **other elements that encourage pedestrian movement, such as landscaping, public art, and site furniture**

In 1993, in order to discover what the needs and expectations of pedestrians were in this region, the MAG Pedestrian Working Group analyzed 15 local sites with varying degrees of pedestrian accommodations. The data identified potential origins and destinations for pedestrians, the perceptions of personal safety and security held by people who walk, reasons for walking, pedestrian counts, long range plans for the area, physical measurements, and other pedestrian facilities. The *MAG Pedestrian Area Policies and Design Guidelines* were the result of this effort in 1995.

Since the document was completed, Valley planners and designers have had a chance to read and use the document and put the guidelines into practice. Additionally, there are new studies in several areas of pedestrian activity, including Safe Routes to School, elderly mobility, and changes in the Americans with Disabilities Act Accessibility Guidelines (ADAAG). This update of the Policies and Guidelines incorporates this new data and creates a more user-friendly document.

### THE PURPOSE OF THE GUIDELINES

The *Pedestrian Area Policies and Design Guidelines* are intended to provide a source of information and design assistance to support walking as an alternative transportation mode. Through application of the policies and design guidance in this document, jurisdictions, neighborhoods, land planners, and other entities will be able to: 1) better recognize opportunities to enhance the built environment for pedestrians; 2) better create and redevelop pedestrian areas throughout the region that integrate facilities for walking with other transportation modes; 3) support the development of areas where walking is the preferred transportation mode; and 4) encourage the development of other independent pedestrian-focused transportation facilities.

The policies and specific design guidelines in this document accomplish this intent by providing policy and design guidance to make all pedestrian areas and facilities safe, comfortable, and a destination for people who use them. Each of these purposes is described below.



A grand announcement to a pedestrian area.

## Safety

First and foremost, a transportation facility must be safe. This update includes recommendations and guidelines directed toward making all pedestrian facilities **safe** for users of all abilities. These minimum levels of safety that should be met in all circumstances include: providing a defined walkway for exclusive pedestrian use that is a minimum 6-foot wide; a walkable surface that is clear of impediments; has ramps where needed; is physically or horizontally separated from vehicular traffic; and is lit at roadway crossings. There are several elements of design, in particular ramps, driveway crossings, and median crossings that, if the project is new, should be built to the standards of the comfortable level to meet ADAAG.

## Comfortable

After safety, there are design options and amenities that can make a pedestrian area **comfortable** and encourage more walking. These include: wider walkways (7 to 12 feet or more); two or three options for physically or horizontally separating the walkway from traffic; reducing the number of driveway crossings; providing places to sit; or adding traffic calming features.



*Pedestrians enjoy a comfortable, shady spot.*

## Destination

Lastly, pedestrian areas that are safe and comfortable can be made **destinations** unto themselves, to which people walk to and walk within. Destinations are places where walking is considered a predominant, if not the only, mode of transportation. They often have extensive amenities which include specialty paving, themed signs and site furnishings, decorative lighting fixtures, street vendors, and an active street.

These guidelines additionally incorporate the principle of universal design. Universal design is a philosophy of facility design that seeks to maximize the suitability of a facility for ease of use by the greatest number of people. It emphasizes the value of designing facilities for a person's entire lifespan and range of abilities. The seven principles of universal design are:

- *equitable use*
- *flexible use*
- *simple and intuitive use*
- *perceptible information*
- *tolerance for error*
- *low physical effort*
- *size and space for approach and use*

*(Accessible Environments: Toward Universal Design. Mace, Hardie & Place, 1991).*

Universal design recognizes that all users benefit when facilities can be easily used by people with a wide range of abilities. For example, a ramp to the entrance of a building is often used by parents pushing strollers or workers moving equipment on trolleys. These people benefit in addition to individuals with disabilities who use wheelchairs or scooters and their families, friends, and associates. Furthermore, incorporating the principles of universal design at the early stage of a project is far less expensive than having to go back and retrofit inaccessible facilities. In addition, this document is in conformance with **the ADA Draft Public Rights-of-Way Accessibility Guidelines.**

These Guidelines refer to several widely used transportation manuals such as the *Manual on Uniform Traffic Control Devices* (MUTCD); the *A Policy on Geometric Design of Highways and Streets* (also known as the *Green Book*) of the American Association of State Highway Transportation Officials (AASHTO); and the AASHTO *Guide for the Planning, Design and Operation of Pedestrian Facilities*. However, the warrants and standards referred to in these manuals do not always meet the pedestrian's needs. To better provide for pedestrians, this document suggests alternative design standards that could be applied in specific pedestrian areas. At a minimum, AASHTO, the MUTCD, and other accepted or adopted jurisdictional design standards must be met.

Finally, this document includes simple how-to information on implementing programs to increase awareness about pedestrians and the facilities that they require.

## WHAT ARE THE BENEFITS OF THIS EFFORT

When we create places where people walk, we contribute to the health, economy, and livability of our communities. The many contributions of walking to our communities have been recognized on a national scale and have spawned national movements such as *healthy communities* and *active living*. Federal, state, and local governments have all started to re-examine our built environment and retrofit and design places to safely and comfortably walk.

### Health

In Arizona, the number of people who report being obese has increased five percent between 1991 and 2001. Arizona is not unusual. Obesity in the United States is truly epidemic. In the last

## Pedestrian Friendly Communities <sup>1</sup>

- **have a healthy town center**
- **have mixed uses**
- **have public gathering places**
- **are designed for universal access**
- **have slowed traffic on key pedestrian streets**
- **have a linked pedestrian system**
- **provide most services within a walkable distance of most homes (¼ to ½ mile)**
- **were designed first for people, then for vehicles**
- **have human scale buildings**
- **have lots of people walking**
- **prioritize spending to focus on the pedestrian environment**
- **have visionary leaders**

<sup>1</sup> Burden, Dan. *How Can I Find and Help Build a Walkable Community*. (<http://walkable.org/article1.htm>).

ten years, obesity rates have increased by more than 60 percent among adults. Approximately 59 million adults are obese. Since 1980, obesity rates have doubled among children and tripled among adolescents. Of children and adolescents aged 6 to 19 years, 15 percent—about 9 million young people—are considered overweight.

Despite the proven benefits of physical activity, more than 60 percent of American adults do not get enough physical activity to provide health benefits. More than a third of young people in grades 9 to 12 do not regularly engage in vigorous

physical activity. Unhealthy diet and physical inactivity play an important role in many chronic diseases and conditions, including type 2 diabetes, hypertension, heart disease, stroke, breast cancer, colon cancer, gallbladder disease, and arthritis.

These statistics come at a great cost to our nation. Among children and adolescents, annual hospital costs related to obesity were \$127 million during 1997–1999 (in 2001 constant U.S. Dollars), up from \$35 million during 1979–1981. In 2000, the total cost of obesity in the United States was estimated to be \$117 billion, of which \$61 billion was for direct medical costs and \$56 billion was for indirect costs. Among U.S. adults in 1996, \$31 billion of treatment costs (in year 2000 dollars)—17 percent of direct medical costs—for cardiovascular disease was related to overweight and obesity.<sup>2</sup>

Research has shown that people living in sprawling areas drive more, while people living in compact communities are more likely to walk. Medical research has shown that walking and similar moderate physical activity is important to maintaining healthy weight and bestows many other health benefits.

Statistics on the relationship between the built environment and obesity have been quantified by a national study undertaken by Smart Growth America in a special report “*Measuring the Effects of Sprawl*.” The study found that people who live in sprawling communities have a higher Body Mass Index (BMI) than those who live in communities that are designed to encourage walking.

The study also found a direct relationship between sprawl and chronic disease. The odds of having hypertension, or high blood pressure, are six percent higher for every increase in the degree of sprawl. The 25 most sprawling counties had average

hypertension rates of 25 per 100 while the 25 least sprawling had hypertension rates of 23 per 100. This study concludes that people in sprawling areas walk less for exercise, which may help explain the higher obesity levels. But routine daily activity, such as walking for errands, may have a bigger role. When the researchers controlled for the amount of walking for exercise that people reported, they found that people in more, sprawling counties weigh more whether or not they walk for exercise. This suggests that people in sprawling areas may be missing out on significant health benefits that are available simply by walking, biking, climbing stairs, and getting physical activity as part of everyday life.<sup>3</sup>

## Economy

Increased pedestrian and walking opportunities can greatly effect the quality of health for an aging population. The Partnership for Preservation has initiated a program entitled ‘Creating Communities for Active Aging’, a plan to increase biking and walking by older adults. Regular, moderate exercise by older adults can help delay, prevent, or lessen the onset of disabilities and many chronic diseases, such as coronary heart disease, diabetes, colon cancer, arthritis, and high blood pressure. Regular exercise can improve mood and alleviate depression. Greater health among older adults equates with longer independence and greater dignity.<sup>4</sup>

Recognizing the relationship of walking to economic development is a key component of making an area attractive to the workers of the New Economy and high technology economy. While studies measuring the economic impacts of walking are

<sup>2</sup> National Center for Chronic Disease Prevention and Health Promotion. ([http://www.cdc.gov/nccdehp/pe\\_factsheets/pe\\_pa.htm](http://www.cdc.gov/nccdehp/pe_factsheets/pe_pa.htm).)

<sup>3</sup> Smart Growth America. *Measuring the Effects of Sprawl*. (<http://www.smartgrowthamerica.org/healthreport.html>.)

<sup>4</sup> Partnership for Prevention. (<http://www.prevent.org/projects.cfm?id=17>.)

limited, downtown revitalization efforts focused on the “Creative Class” recognize that creating a sense of place where people want to live and work focuses on creating public spaces that foster a sense of community. To be effective, these spaces need to be safe, comfortable, and a destination that encourages people to walk.

The City of Tallahassee, Florida recognized the relationship of walking to economic development in its *Bicycle and Pedestrian Master Plan*. It recommends the following actions to encourage economic development through pedestrian activity:

- *Make quality-of-place a central element of regional economic development efforts.*
- *Integrate amenities and natural assets into all aspects of regional economic development, talent attraction, and marketing efforts.*
- *Invest in the outdoor, recreational, and life-style amenities of the New Economy as a component of regional economic development and talent attraction efforts; for example, the creating climbing walls, mountain bike trails, bike paths, and roller-blading areas throughout the city and region. Explore the possibility of bringing in outdoor competitions and events such as triathlons, bike races, rowing competitions and similar efforts. Orient waterfront improvements to encourage active, recreational activities such as rowing, sailing, and windsurfing and improve public access for these activities.*
- *Upgrade the areas surrounding major universities and colleges and make them centers for New Economy recreational amenities.*
- *Establish better and more user-friendly transit connections from the university districts to downtowns and high technology business areas through the use of light rail, mass transit or bike lanes.<sup>5</sup>*

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<sup>5</sup> Tallahassee-Leon County Planning Department. *Bicycle & Pedestrian Master Plan*. (<http://www.state.fl.us/citytlh/planning/trans/bikeped/masterplan/bpmwalkability.html>.)

## **Livability**

When we walk we engage in “face to face” contact – the most personal type of interaction between strangers. It has long been recognized in the corporate world that managers must walk through their offices to understand what is really going on. The same can be said for communities. Walking provides opportunities for the type of face to face interactions that form the bonds of community and neighborhood. Creating places where people have the opportunity to meet their neighbors face to face and to interact with them in a manner that is not restricted by the speed or physical barrier of an automobile contributes to a sense of community. Creating places where people can walk from their home to school, a park or local shopping increases the opportunity for social interaction and as a result, enhances the potential for community building.

## **WHO SHOULD USE THIS DOCUMENT**

This document will be helpful to anyone who is involved with pedestrian facilities, be it at the planning or facility design level within a city, the drawing level of a design firm, or the on-the-ground efforts of community associations or individuals.

## **HOW THIS DOCUMENT IS ORGANIZED**

The MAG *Pedestrian Area Policies and Design Guidelines* are composed of three parts. The first section “Principles and Abilities of Pedestrians” provides a basic understanding of pedestrians and their movements, such as walking distances or the influences that effect a choice of walking over driving.

## Why and How to Use This Document

### IF

**A ...the purpose is to consider whether a pedestrian facility qualifies for MAG funding?**

**B ...the purpose is for a municipal employee to use it to consider ways to improve the city or town's pedestrian environment?**

**C ...they are being used to design a pedestrian facility?**

### THEN

**A, B and C – Read and understand *Principles and Abilities of Pedestrians*.**

### THEN

**A Using the methodologies in the *Identify Pedestrian Facility Needs*, calculate the latent pedestrian demand and, if appropriate, the roadside condition to determine the need for improvements.**

**B Read through the *Recommendations* to determine what items can be implemented.**

**C Consult the section on *Design Principles and the Specific Design Guidelines*.**

The second section, "Recommendations" includes policies for local governments and other entities that could result in better accommodation of pedestrians.

The final section "Design Principles" can be used by project designers, along with the "Specific Design Guidelines". The Guidelines delineate those physical improvements that are required

for a facility to be safe, what can make it comfortable, or what will make it a pedestrian destination.

A glossary and bibliography follow these sections. The bibliography includes Internet links to current resources available on the subject of pedestrian facility design.

## CHANGES IN THIS UPDATED DOCUMENT

This update has reorganized the information from the 1995 document. In the 1995 guidelines, the concepts of neighborhood, community, district, and campus were used to help identify the type and design of facilities for pedestrians. The guidelines suggested that areas that received little use (such as neighborhoods or communities) do not require extensive facilities to be functional. Additionally, the concepts of pedestrians by choice and necessity were introduced to assist in prioritizing investments - with the suggestion that it was most important to provide facilities for pedestrians by necessity.

These guidelines are premised on the concept that all facilities, no matter how frequently they are used, and by how many people, need to be safe. **Once basic safety has been addressed, enhancements that would encourage walking should be considered.** These enhancements make pedestrian facilities comfortable and areas where walking is the desired transportation mode into destinations. Additionally, since these guidelines follow the principles of universal design, all facilities are designed for maximum ease of use by any pedestrian, the concepts of pedestrians by necessity and choice have been removed. Anyone has the right to a safe pedestrian facility whenever they use it.

To help determine if an area should be designed as safe, comfortable, or a destination, this document assists the user in calculating the latent pedestrian

## Fundamental Concepts: Safety, Comfort and Destination

**Safety:** All areas that people walk should be safe. The minimum levels of safety that should be met in all circumstances include providing a defined walkway that is for exclusive pedestrian use that is a minimum 6 feet wide, a walkable surface that is clear of impediments, has ramps, that is vertically or horizontally separated from vehicular traffic, and is lit at roadway crossings.

**Comfort:** Comfort encourages people to walk instead of use other modes of transportation. Facilities to encourage a comfortable pedestrian facility and environment include: wider walkways (7 to 12 feet or more); two or three options for vertically or horizontally separating the walkway from traffic; reducing the number of driveway crossings; places to sit; or added traffic calming features.

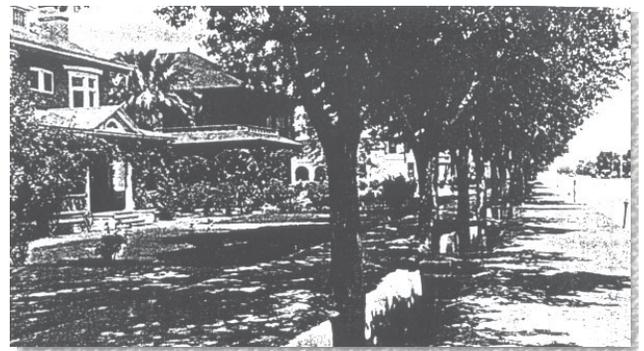
**Destination:** Destinations are places where walking is considered a (if not the) predominant mode of transportation. They often have extensive amenities which could include specialty paving, themed signs and site furnishings, decorative lighting fixtures, street vendors, and an active street.

demand for pedestrian facilities. Areas with low latent demand should be, at the very least, safe. Areas with medium latent demand should be designed to be safe and comfortable. Areas with high latent demand should be designed to be safe, comfortable, and as destinations. In the design guidelines, the concepts of safe, comfortable, and destination are correlated with a facility standard level.

This update also includes new research on the latest data on the economic, social and health benefits of walking, how to better serve the growing elderly population, and better address how facilities are designed for persons with disabilities.

## A BRIEF HISTORY OF PEDESTRIAN PLANNING IN THE MAG REGION

In the United States, sidewalk awnings and pedestrian ways were common in most retail districts at the turn-of-the-century. Shopkeepers wanted to provide the best possible ambiance for potential customers, including protection from rain and sun. Major civic improvements usually involved the addition of street trees to shade pedestrian routes, especially



Central Avenue north of Fillmore Street.

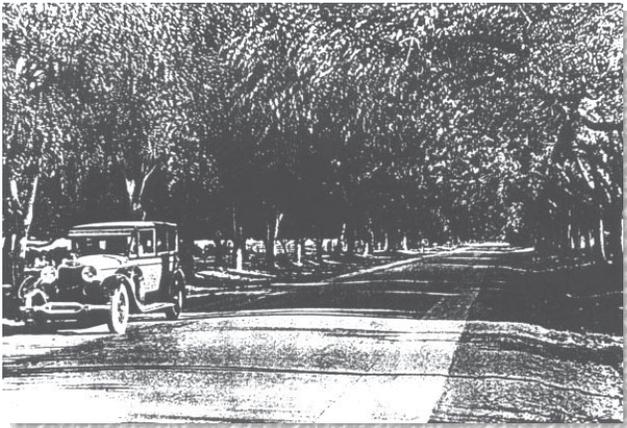


1948: Central Avenue and Roosevelt Street.

with the advent of the City Beautiful movement in the 1890s.

Historic photographs from the Phoenix Library Collection and the Arizona Collection archives show tree-lined streets which created comfortable pedestrian places in the MAG region during the early 1900s.

With the arrival of the automobile, new standards were developed to accommodate motorized transportation. Streets were widened as the number of vehicles increased. The pedestrian environment became compromised as streets were widened and canals buried, sidewalks were narrowed and trees cut down. Former planting areas became travel lanes for vehicles, and sidewalks were encumbered with utility poles and traffic signs.



*Central Avenue north of Bethany Home Road.*

In the past 40 years, there have been several important steps taken to address pedestrian needs throughout the MAG region. Despite these specific actions, many roadways are still constructed with little consideration for the pedestrian.

This report is part of a trend toward recovering space and amenities for pedestrians and creating viable pedestrian areas. Properly planned pedestrian areas encourage people to walk, thereby reducing the need for automobile travel. This in turn reduces traffic congestion, improves air quality, creates livable, sociable communities, and improves health, fitness, and independence of community residents.



*1924: Town Ditch.*





## THE PRINCIPLES AND ABILITIES OF PEDESTRIANS

Arizona State Statutes define pedestrians “as any person afoot. A person who uses an electric personal assistive mobility device or a manual or motorized wheelchair is considered a pedestrian unless the manual wheelchair qualifies as a bicycle. For the purposes of this paragraph, motorized wheelchair means a self-propelled wheelchair that is used by a person for mobility.” (A.R.S. 28-101.40)

Throughout this document, the term ‘walk’ or ‘pedestrian’ refers to people who are walking

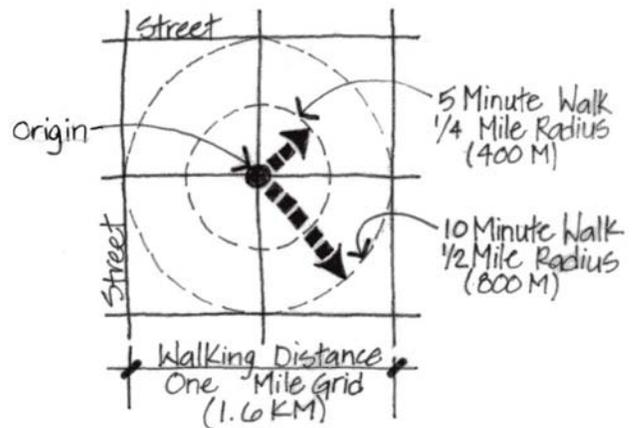
or using some form of special walking aid or motorized or non-motorized assistive technology device.

Certain principles or assumptions have emerged as common factors found in all types of successful pedestrian areas and they explain the conditions needed for people to choose to walk. **All are of equal importance and relevance.**

### PRINCIPLE #1

**People will choose to walk a 10-minute trip or a ¼ mile to a destination and even longer (up to 20 minutes or a ½ mile) if the route is comfortable and safe or if the need is great.**

The most common reason cited nationally as to why people do not choose to walk is real or perceived distance. Other factors which contribute to an individual’s decision to walk are how safe they feel when using the facility (this applies to feeling safe from the threat of being hit by a car and assault by another person), weather, and comfort. Research by the Federal Highway Administration (FHWA) shows that most people will walk ¼ mile (0.4km), or approximately 1,400 feet (427m) with one mile (1.6km) as the maximum distance



The 10-minute rule.

of a walking trip. Research also shows people of average ability walk at an average of 4 feet (1.2m) per second. When translated into minutes, the ¼ mile trip takes five minutes and the ½ mile trip takes ten minutes. Younger, older, and persons with disabilities tend to walk more slowly (2.5 to 3 feet per second). This means that they may take slightly more time (approximately seven minutes) to walk ¼ mile, and as much as 15 minutes to walk ½ mile.

A pedestrian area is more likely to be successful if walking routes from residences or other origins to destinations recognize distance and directness of the route as planning criteria. Regular spaced seating areas or resting spots will increase the distance traveled by all pedestrians. This is especially important in areas where a large portion of the population has limited access to motorized transportation. A successful pedestrian area combines a strong linkage between residences and places of basic necessity with convenient pedestrian access to a public transit system that connects with the rest of the community.

### PRINCIPLE #2

**People will choose to walk if the route is interesting.**

Pedestrians will walk farther than ½ mile (0.8 km), or longer than ten minutes, if the route is interesting. The route can be made interesting by other pedestrians, or by providing elements such as public art, plantings, storefronts with windows and doors, long views and vistas, and interpretive signs.



*Pedestrians enjoy the shops.*

### PRINCIPLE #3

**The land use mix and its density influences whether people walk.**

People are more likely to walk to their workplace, entertainment venues, or destinations that provide basic necessities, if they are within ½ mile. For example, mixed-use or new urbanist style development (development that mixes different land uses such as housing, services, shopping, entertainment, and employment) has been shown to reduce both automobile use and overall parking needs.

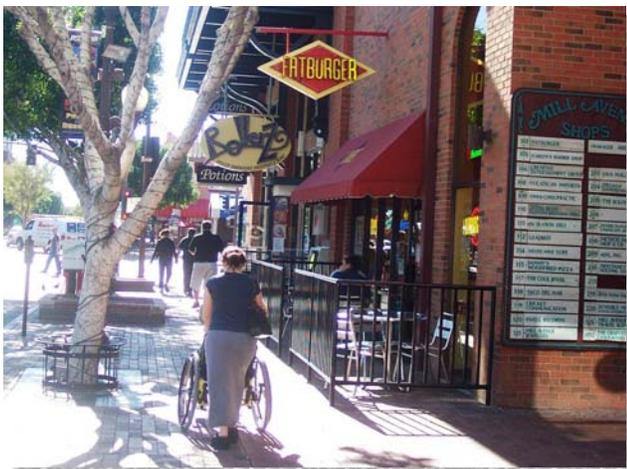
Within the MAG region, some new development has included mixed use components that have been well-received. These developments are generally located in downtown areas or are the focus of large, master planned communities. However, most new development still consists of single use, low-rise, low-density development, with segregated retail and employment uses. Continued support of denser development and varied land uses in residential and employment areas, accessed by direct pedestrian routes, could encourage more pedestrian travel, reduce overall parking needs, and decrease traffic congestion.

**PRINCIPLE #4**

**In a dense, urban setting, the pedestrian route is more likely to be used if destinations are closely spaced and building entrances are located immediately adjacent to the pedestrian route.**

Easy pedestrian access to retail shops, and the close spacing of these shops, is to the advantage of the pedestrian and the retailer. This is evidenced by the renewals of downtowns and dual-entrance retail, common to many new urbanized developments. For example, access only from parking garages or lots increases the distance of the pedestrian trip, which can discourage walking.

Closely spaced locations eliminate the need for linked trips with a series of stops and starts. A variety of destinations in one location also increases the number of pedestrians. Studies have found that 15 percent of vehicular lunch time trips are to destinations less than ½ mile away. Clustering these destinations within walking distance of the workplace enables these trips to be made by a pedestrian rather than a vehicle. Research shows that store fronts with entrances ranging from 35 feet (10m) to 60 feet (18.3m) apart are best, depending on the intensity of the area. The shorter the distance between destinations, the more



*People enjoy closely spaced shops.*

accessible the destinations and the more interesting the walking/shopping experience will tend to be.

Conversely, long walls without entrances or windows will cause a pedestrian to stop walking, assuming there is no more to see.

**PRINCIPLE #5**

**Pedestrians seek the most direct route. The lack of a safe, convenient, direct route may determine whether people walk or not.**

Many residential communities are surrounded by walls, or are gated for security. These features create barriers to transit stops and neighboring commercial areas with convenient shopping and services. If safe, convenient pedestrian connections are provided to these destinations from residential neighborhoods, people could choose to easily walk to these destinations. Additionally, if signs, landscaping, decorative paving, or other distinctive features are used to clearly mark the route and make it more pleasant and interesting, the route will more likely be chosen as an alternative to using a vehicle.



*People choose the most direct route.*

### PRINCIPLE #6

#### Safety is paramount.

The Arizona Department of Transportation (ADOT) *Motor Vehicle Crash Facts 2000* reports that 1.26 percent of all crashes in the year 2000 involved pedestrians. Of that number, 7.86 percent, or 130 crashes, were fatal. Put more simply, two to three Arizona pedestrians die each week because they were hit by a car. Over 27 Arizona pedestrians are injured every day due to crashes with vehicles.<sup>6</sup>

Implementation of a safety program can help to diminish pedestrian/vehicle conflicts. One such program is WALK ALERT (Operation PedSaver). WALK ALERT is a comprehensive program addressing pedestrian safety from three points of view: public education, traffic engineering, and law enforcement. It is also known as the National Pedestrian Safety Program, and is a cooperative effort of the National Safety Council, Federal Highway Administration (FHWA), National Highway Traffic Safety Administration (NHTSA), and more than 100 service organizations and groups. The goal of the WALK ALERT program is to reduce pedestrian accidents through the development of safer walkers, more attentive drivers, and a safer walking environment. WALK ALERT has already been implemented in approximately ten states and continued federal support is expected, which will hopefully result in its continued adoption in other states.

Many States have also implemented programs for older adults and child pedestrian safety. Frequently these programs are offered by police departments and schools. For example, El Paso, Texas has implemented a safe communities program that includes enforcement, data collection and education to increase the safety of its streets.<sup>7</sup> Florida also offers many programs on pedestrian

<sup>6</sup> (<http://www.azdot.gov/mvd/statistics/crash/index.htm>).

<sup>7</sup> ([http://www.elpasotexas.gov/police/safe\\_communities.asp](http://www.elpasotexas.gov/police/safe_communities.asp))

safety and works with local governments to implement these efforts.<sup>8</sup> The California Safety Council offers fairs and festivals that promote pedestrian safety.<sup>9</sup> The FHWA also provides guidance materials on implementing pedestrian safety programs.<sup>10</sup>

Another approach, in addition to educating pedestrians about reducing danger due to moving vehicles, is to decrease traffic speeds and notify drivers that pedestrians may be nearby. Traffic calming is commonly used to decrease traffic speeds and includes a variety of design components including chokers, median strips, speed bumps and humps, and narrow lanes to slow drivers down. Signing, in-pavement markers, dagmars, striping, and changing textures are all tools for making drivers more aware of their surroundings and alerting them to the potential of a pedestrian using the roadway. Traffic calming is discussed more in the Specific Design Guidelines.

### PRINCIPLE #7

#### People will create their own path.

If people have to walk, or have a strong desire to do so, they will walk even if there is no clear pedestrian route provided. Trespassing and vehicular/pedestrian conflicts can result if pedestrian needs are not met in a reasonable way. Paths worn across open areas indicate a “desire line” where people have a need to walk to a particular destination. Jaywalkers on a busy street indicate that people will take the most direct route, even if it is not the safest route. Jaywalkers and desire lines are an indicator that people will not walk out of their way to use provided routes if those routes are not the shortest to their destination.

<sup>8</sup> (<http://www.dcp.ufl.edu/centers/trafficsafetied/trainingworkshop.htm>)

<sup>9</sup> (<http://www.safetycouncilonline.com/healthfairs.htm>)

<sup>10</sup> (<http://www.fhwa.dot.gov/environment/bikeped/pedbiketrb2004.htm>)



People wear a path to where they want to go.

### PRINCIPLE #8

**The number of driveway crossings along a walkway is inversely proportional to the pedestrian's perception of it as a desirable route.**

Driveway crossings along a street to accommodate vehicular access means the pedestrian has to stop for a car turning in, has to move around a car waiting to enter traffic, or, at least, must be on the alert for these situations. The more frequently this occurs, the less the walkway is perceived to be a continuous pedestrian route. Therefore, minimizing driveway crossings and consolidating driveways will help keep the pedestrian route intact.

### PRINCIPLE #9

**If people do not feel personally secure, even though the pedestrian route is considered safe from traffic, they will not choose to walk.**



Multiple driveway crossings are difficult to maneuver.

As part of the research for the 1995 document, individuals were asked what levels of surveillance by police made them feel secure. The research indicated pedestrians perceive car patrols are only somewhat safe. The most positive method of providing a feeling of security for the pedestrian is furnishing foot or bicycle police patrols. These security measures represent parity with the pedestrian; whereas a patrol car separates the police from the individual. People also seek out other pedestrians, and perceive strength in numbers. Heavily used pedestrian areas that have no visibility barriers tend to police themselves.

Community design also influences a pedestrian's sense of personal security. Crime Prevention through Environmental Design, or CPTED, is a recognized set of design principles that can result in an environment being safer and more secure for a pedestrian.<sup>11</sup> Some key CPTED principles include natural surveillance, territorial reinforcement, natural access control and target hardening<sup>12</sup>.

<sup>11</sup> (<http://www.cptedtraining.net/>)

<sup>12</sup> (<http://cpted-watch.com/introduction.htm>)

Regular maintenance and upkeep also make an area feel more secure. People feel safer in a clean, organized environment.

Lighting can enhance people's feeling of security. In most cases, lighting designed for the automobile is assumed to project sufficient lighting for pedestrian facilities adjacent to the roadway. However, the overhead light provided by vehicular lighting is often shadowed by buildings and trees, and may not be sufficiently bright on the pedestrian's walking surface.

Lighting in more intensively used pedestrian areas should be sufficient to illuminate the wider walkway area. Incidental light can also be provided from store window displays, which in turn can also enhance the walking experience.

### PRINCIPLE #10

**Pedestrians like to be separated from moving traffic.**

The general lack of on-street parking in retail and commercial areas is one of the most distinct differences between our region and other regions of the country. Over time, the need for accommodating vehicular traffic and improving air quality has led to the removal of parallel or diagonal parking, reduced overall walkway areas, landscaping removal and thus reduced shade adjacent to the remaining walkway.

In new commercial areas, parking has been moved off the street and into parking lots. This has increased the distance the pedestrian must walk from the street to their destination. Curb cuts provided for vehicular access to the parking areas from the street has created more curb ramps and driveway crossings, diminishing the effectiveness of the walkway. Finally, even pedestrians in a parking lot must walk from their cars in an area



*People like to be separated from traffic..*

that is not protected from other cars, and is commonly unshaded.

On-street parked cars offer a sense of safety and buffer pedestrians from vehicular traffic. People parking, getting into and out of their cars, and darting into shops also add to the pedestrian life of the area. A buffer between a roadside pedestrian facility and moving traffic can also be achieved by placing a landscaped area between the facility and the roadway. Where space is limited, a vertical barrier such as a curb, low wall, fence, or bollard can also separate pedestrians from traffic.

### PRINCIPLE #11

**People will choose to walk if the walkway has sufficient capacity.**

Walkway capacity is dependent on the anticipated level of use, the intensity and speed of traffic to which it is adjacent, and the number of obstacles within the walkway.

The capacity of walkways is directly related to the effective walkway width, or that portion of the walkway available to, or typically used by, pedestrians for movement. Walkway width should



*Wide walkways encourage walking.*

change with the anticipated level of pedestrian use, to accommodate more and different types of users, and the social interaction generated.

Studies have found there is also a “buffer effect” that will limit the effective walkway width - that people will shy away from the curb, building walls, window shoppers, and street furniture such as benches, trash containers, and planters. Light poles, for example, can preempt as much as 3.5 feet (1.0m) of the total width of the walkway. If street traffic is usually fast, heavy, and adjacent to the curb, the width of the sidewalk must be adjusted to account for the buffer effect. Stationary objects such as a parked cars, fences and bollards, or a horizontal distance such as a bike lane that separates the pedestrian from the moving vehicles provides a buffer effect.

### **PRINCIPLE #12**

**Pedestrians feel most comfortable in areas that have human scale in design elements.**

The edges, detailing, and texture of the pedestrian spaces defines its scale for the pedestrian. People are more comfortable in areas that are scaled for the pace they travel and the space they need to maneuver. Ratio of building height to street,

walkway width, frequency and height of windows, doorways, or openings, hardscape and plant materials, and street furnishing can add to or detract from a sense of human scale in the pedestrian area.

In addition to scale, the organization of the of space within the pedestrian environment can contribute to the comfort of the pedestrian. Organizing pedestrian environments so pedestrians can recognize areas where they may come into close contact with vehicles or other users such as equestrians, bicycles or roller-bladers (or even have to share their space with them); where they can expect amenities such as benches or shade; and where they can expect that only pedestrians will be allowed, helps the pedestrian to manage their space and make it human-scale.

A Home Depot in Manhattan recognizes the importance of a human scale to attracting pedestrians. It has replaced its typical tall blank walls with display windows. The windows create a human scale because they have elements that are human sized and to which pedestrians can relate.<sup>13</sup> More and more, big box retail stores



*Human scale places are more inviting.*

<sup>13</sup> (USA Today, *Big-box stores squeeze into Big Apple*, October 18, 2004.)

## Pedestrian Policies and Design Guidelines

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are modifying their designs so that they are more appropriate to their environment. These modifications include providing pedestrian facilities to guide shoppers from the street through parking lots, re-situating buildings closer to the curb to make them more accessible to pedestrians (and more visible to passing automobiles), improving lighting, and re-orienting delivery areas to enhance “back door” access from adjacent neighborhoods.



*Home Depot Manhattan.*



## RECOMMENDATIONS FOR JURISDICTIONS

Recommendations are policies most suited toward local governments or other regulatory entities that may result in better accommodation of pedestrians. These recommendations apply to all types of successful pedestrian areas: urban or suburban, infill or new, downtowns, campuses, office parks, shopping centers, schools, hospitals and everywhere people walk.

## RECOMMENDATION CATEGORIES

The recommendations are organized into the following categories:

- *Administration*
- *Security and Safety*
- *Quality of Life*
- *Priority of Implementation*
- *Community Participation*
- *Pedestrian Education*

## ADMINISTRATION

**Identify a staff person who is responsible for reviewing all planning and construction projects to confirm that pedestrians are included.**

In an era when trip reduction and alternative modes of transportation are advocated to reduce air pollution, the pedestrian needs the same type of support as the Bicycle Coordinator gives to the recreational and commuter bicyclist, in terms of route finding, access, safety programs, funding, and general advocacy.

Although local jurisdictions have staff with specific responsibilities for bicycles and vehicles, few have designated staff responsible for the interests of the pedestrian. The designation of a Pedestrian Coordinator, at the local government level, would address pedestrian needs and fill this gap.

The Coordinator's responsibilities should include: gathering data on pedestrian needs within the community; providing planners with data on the number and type of pedestrians in a particular area; reviewing plans to ensure the pedestrian is adequately considered in them; identifying areas which should better serve the pedestrian; and generally advocating for pedestrian safety, security, access, comfort, and destinations.

### **Require development proposals to include pedestrian circulation plans.**

For many jurisdictions, a circulation plan is a typical requirement of development review. Pedestrian circulation should be included as a part of the development plan whether the new development proposal is for a site, subdivision or a master planned community. Depending on the size of the proposed development, the pedestrian plan should address direct and walkable access to pedestrian destinations, pass-throughs to reduce the distance between destinations, and an overall plan that considers walking distances. The pedestrian circulation plan should identify pedestrian accommodations throughout the site and pay particular attention to intersections, and access to transit and community destinations such as schools, parks, shopping, and adjacent developments.

### **Use the American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Planning, Design, and Operation of Pedestrian Facilities* in combination with the *Manual on Uniform Traffic Control Devices (MUTCD) Pedestrian Warrant system* to help determine the need for traffic signals.**

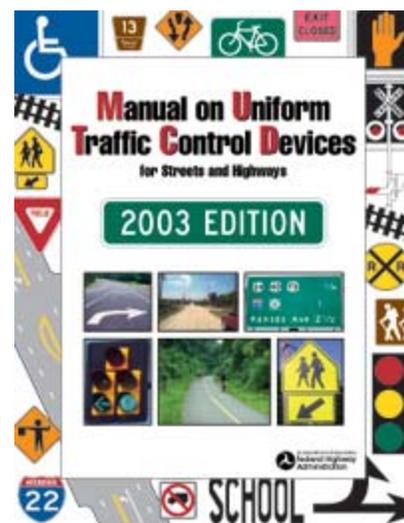
The AASHTO *Guide for the Planning, Design and Operation of Pedestrian Facilities* was recently re-written and focuses on identifying effective measures for accommodating pedestrians on public rights-of-way. The MUTCD manual is commonly used to set speed limits and identify appropriate traffic control devices. Both publications include guidance on pedestrian warrants. A pedestrian warrant system is a process for determining when and where traffic devices such as traffic signals, stop signs, pedestrian bridges, and yields, are “warranted”.

These manuals describe how to set the timing of traffic lights based on the travel speed of the

average pedestrian. According to a study conducted by FHWA using the 4 feet per second average pedestrian walking speed, 78 percent of pedestrians would have to increase their normal speed to cross the street before the signal changes. **Because these guidelines advocate universal design, the low end of the average pedestrian walking speed, 2.8 feet per second, should be the measure for setting signal timing.**

In places that have sufficient latent demand to be considered a destination, or in school zones, consideration may also be given to walking speeds of even slower than 2.8 feet per second. For example, studies have shown that while 4 feet (1.2m) per second is the median speed of pedestrians, at crosswalks where people are crossing in a group, this speed slows.

In interviews conducted during the course of the 1995 study, many pedestrians complained that they could not get across the street before the “Don’t Walk” signal flashed. While it is the intent of the flashing signal to merely warn pedestrians that they should not start across the street, the pedestrians interviewed exhibited a clear misunderstanding of this intent. Better education



The Manual on Uniform Traffic Control Devices (MUTCD)

or modification of the system needs to be done to more closely align the intent of the signal, with the understanding of the pedestrian.

**Identify and update the inconsistencies within municipal and county ordinances and policies, which are barriers to developing pedestrian areas.**

Zoning ordinances focus on ensuring that a site is developed with adequate parking, landscaping, lighting, and other amenities. However, because zoning focuses on sites, and not how to connect, connections between sites are often overlooked in the review process. Additionally, many ordinances require buffers and separations between uses (especially commercial and residential uses), perimeter fencing, setbacks, and rear yard deliveries that become barriers to pedestrian activity. These barriers to pedestrian activity should be identified and rectified by planning staff or the pedestrian coordinator within each jurisdiction.

**Replace any pedestrian facility with like or better facility with all roadway projects. If no pedestrian facility exists, provide facilities in accordance with these guidelines.**

Pedestrian routes frequently follow roadways. Historically, roadway design is oriented towards moving automobiles, and merely accommodates other forms of transportation, such as bicycling and walking. As a result, some roadway design minimum standards do not meet the standards of this document for safety and comfort. These guidelines recommend that the pedestrian environment be considered just as critical an element as the vehicular environment in designing transportation infrastructure. Depending on the intensity of the pedestrian use within any given area, the pedestrian should be given a range of considerations. In all cases, minimum safety and security issues should be addressed, including signs. In pedestrian areas where comfort and

destination are considerations, the pedestrian should be given preference over, or at least parity with, the vehicle.

The greatest obstacle to providing adequate pedestrian space is competition for the same space by the automobile. In addressing traffic congestion, the first area to be impacted is usually the pedestrian space - narrowing the sidewalk and landscaping or removing a median and pedestrian refuge to accommodate an extra lane or a new interchange. This is frequently done without adequate consideration of the importance of the pedestrian to the land uses in the area, or to their actual or potential numbers, which could dictate the type and extent of pedestrian facilities such as the width of the sidewalk or amount of area available for planting shade trees.

**Incorporate design details from this document into the MAG Uniform Standard Details for Public Works Construction.**

Many jurisdictions throughout the MAG region rely on the MAG 2004 ENGLISH Uniform Standard Details for Public Works Construction (Standard Details) book for roadway facility design. While the Standard Details book is regularly reviewed and updated, it is deficient in providing details that enhance the quality of the pedestrian environment. The MAG Pedestrian Working Group should work with the MAG Standard Specifications and Details Committee to update the Standard Details to include these specific design guidelines in the MAG 2004 ENGLISH Uniform Standard Details for Public Works Construction by the end of 2005.

**Sponsor periodic training courses and other activities, such as participation in national walking conferences and events, to enhance professional staff and community knowledge of good pedestrian facility design.**

Periodic training will help to keep professionals and others up-to-date on the latest techniques

to improve the design and safety of pedestrian facilities. The FHWA offers, through the Pedestrian and Bicycle Information Center (PBIC)<sup>14</sup>, a variety of courses on pedestrian safety and design. Each year, the PBIC sponsors PROBIKE/PROWALK to bring walking and bicycling professionals together to discuss the latest findings and technologies.

### **Develop pedestrian overlay districts for downtown areas and other pedestrian destinations.**

Recognizing the importance of pedestrians to its environment, the cities of Charlotte, North Carolina<sup>15</sup> and Seattle, Washington<sup>16</sup>, among others, have provisions for a pedestrian overlay zone in their ordinances. These zones are applied around transit stops, in downtowns, and other areas where pedestrian activity is desired and expected. The ordinances address setbacks, landscaping, walls, parking standards, lighting, and other elements that directly impact the safety and comfort of pedestrians.

## **SECURITY AND SAFETY**

This category represents steps that should be taken to foster either an intrinsic sense of personal security, or to enhance actions that may increase pedestrian security. These steps, when undertaken by a private management company, chamber of commerce, downtown association, blockwatch or homeowners association, can also promote a more secure environment in private residential areas and business districts.

### **Establish security patrols, either municipal or private.**

The concept of neighborhood policing relies on getting police out of their cars and into the neighborhood. By working with local police, regular

patrols by police or sheriff can be established. While not all of these patrols need to be on foot (many police departments use bicycle patrols or mounted police), citizens can work with local law enforcement to ensure that patrols are most visible during times when pedestrian are most vulnerable (for example, at night). For pedestrian areas that are active 24 hours and/or seven days a week, a small police storefront or mobile station in the pedestrian area provides a strong security presence. These can be funded through self-taxation districts, grants, or reallocation of general funds.

Block watch is an established format for increasing community safety. Information on organizing a block watch program is available from police departments and at a variety of Internet sites such as [http://www.chandlerpd.com/cpd\\_site/fight\\_crime/block\\_watch.htm](http://www.chandlerpd.com/cpd_site/fight_crime/block_watch.htm).

Another way to make areas safer for pedestrians is to work with local merchant organizations or campus police to establish security measures that account for pedestrian use at night such as escorts to parking lots and emergency phones.

### **Enforce traffic laws.**

Speeding and red light running are epidemic in this region. Many communities have implemented 'slow down' campaigns and installed cameras at stop light to prevent red light running. Another way to reduce speeding is through stepped up enforcement.

Education can also help to reduce speeding. Placing electronic speed monitors near crosswalks helps remind a driver that their speed may be higher

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<sup>14</sup> (<http://www.pedbikeinfo.org/training.htm>)

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<sup>15</sup> ([http://library8.municode.com/gateway.dll/NC/north%20carolina/9880?f=templates&fn=default.htm&nusername=19770&npassword=MCC&nac\\_credentialspresent=true&vid=default](http://library8.municode.com/gateway.dll/NC/north%20carolina/9880?f=templates&fn=default.htm&nusername=19770&npassword=MCC&nac_credentialspresent=true&vid=default))

<sup>16</sup> ([http://www.ci.seattle.wa/transportation/SAP/UDistrict\\_LU\\_pack.pdf](http://www.ci.seattle.wa/transportation/SAP/UDistrict_LU_pack.pdf))

than the legal limit. Public education campaigns also help alert drivers to the dangers of speeding.

### **Establish a “Safe Routes to School” program in the community.**

The June 2003 *Traffic Safety for School Areas* outlined by ADOT provides methods for selecting and identifying school sites, for providing safety for off-site facilities (such as logical routes from residences and street crossings), and for establishing a School Safety Program. However, they should not replace field observation of actual pedestrian routes, and the provision of additional safe and secure support systems, including traffic control devices.

Bear in mind that school crossings are governed by A.R.S. 28-797. Refer to the “How-To” pages in this document to see how-to organize a Safe Route to School program in a community.

In addition to the guidance offered by ADOT, [www.walktoschool-usa.org](http://www.walktoschool-usa.org) offers classes, technical assistance and free downloads that can help parent organizations, schools and neighborhoods organize a safe route to school program.<sup>17</sup>

### **Establish a Crime Prevention Through Environmental Design (CPTED) program and plan review process.**

The CPTED program is a review process that evaluates whether proposed improvements within any given project will create security concerns for project users. The CPTED review looks mainly at visibility issues, and “provides minimum standards to safeguard property and public welfare by regulating and controlling the design, construction quality of material, ...location and maintenance of all buildings and structures.” CPTED included four strategies: natural surveillance, territorial reinforcement, natural access control, and target

hardening. Each of these strategies is relevant to creating a safe pedestrian environment.

Natural surveillance is promoted by features that maximize visibility of people, parking areas and building entrances; pedestrian friendly sidewalks and streets; front porches; and adequate nighttime lighting.

Territorial reinforcement is related to the principle of scale and discussed in the previous section. It is promoted by features that distinguish private from public spaces which include and are not limited to landscape plantings, pavement designs, and gateway treatments.

Natural access control is gained by designing streets, sidewalks, building entrances, and neighborhood gateways to clearly indicate public routes and discourage access to private areas.

Target hardening is focused on features that prohibit entry or access relevant to pedestrian facilities such as restrooms, where creating a secure environment is important to personal safety.<sup>18</sup>

CPTED considerations are important to designing pedestrian areas, and for areas considered for potential pedestrian use because pedestrians must not only be safe, they must feel safe or they will not walk.

### **Establish a regular maintenance schedule for facilities adjacent to pedestrian areas.**

Regular maintenance of an area can increase the sense of security of the pedestrian. Buildings must be kept in good repair. Facade improvement should include enhancements to the pedestrian experience. Vacant lots should be weed-free, clean, and preferably put to a temporary, pedestrian oriented use. Infrastructure such as lighting, plantings, roads, and sidewalks should be in good repair and monitored regularly. Phone numbers,

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<sup>17</sup> (<http://www.walktoschool-usa.org/srtsconcept/index.cfm>.)

<sup>18</sup> (Dorinda Howe, [cpted-watch.com](http://cpted-watch.com))

websites, and other contact information should be made available to the public so users can contribute to better maintenance by reporting problems. Graffiti should be eradicated on a consistent basis. The level of maintenance in a community reflects the level of investment being made and perceived commitment to a community.

### **QUALITY OF LIFE**

**Assist in achieving air quality standards by providing better and more functional pedestrian facilities, walkable routes to work and school, and access to transit.**

Pedestrian improvements are an important air quality measure as they can reduce single occupancy vehicle trips and vehicle cold starts, two known significant causes of air pollution. The FHWA considers that “walking and bicycling (are)... part of a tripod that supports alternatives to single occupancy vehicle commuting. The other legs of the tripod are good transit, high density, and mixed use development. These three components together make it easy to get people out of their cars. Logically, it makes sense to start where one or more of these components already exist.”

Over time, these components will lead to neighborhood scale services and activities that support workplace and neighborhood walking for utilitarian purposes, reducing the need for dependence on the vehicle to accomplish these errands.

**Create, at a minimum, comfortable pedestrian facilities and environments that connect the pedestrian system to other transportation modes, in particular, light rail and bus.**

In this region, light rail will be available by 2008. A key component of a successful light rail system is its connections with other transportation modes,

in particular walking. Providing comfortable pedestrian improvements at and around light rail and bus stops, and comfortable pedestrian facilities that connect light rail and bus stops will make these types of trips more enjoyable and encourage the use of these facilities. Some of the specific types of facilities that could contribute to making pedestrian areas around light rail, bus stops, and the pedestrian connections between them comfortable include signing, shade, seating areas, lighting, and sight lines that enable the pedestrian to see the bus from the transit stop and vice-versa.

Pedestrian connections to bus and light rail are important, as are pedestrian connections between these local systems and other larger transportation systems such as interstate bus routes and other modes of transportation including train and air.

**Take advantage of the inherent link between walking and economic development by creating destinations throughout the Valley that encourage pedestrian activity.**

A shopping mall includes the elements of a destination pedestrian facility so it encourages walking and increases the exposure, and hence, sales opportunities to its tenants. Decorative flooring, amenities, visual corridors, and other amenities pull the shopper through the mall. The same principles can apply to outdoor pedestrian areas located throughout our region. Creating retail areas that offer similar amenities, could encourage walking and promote economic development by increasing visibility and access to them. If pedestrian facilities appeal to nearby residents, they will likely appeal to others that come from further away or from outside our region or state.

### **Identify and preserve or enhance the communities character to create comfortable and destination pedestrian areas.**

Identify what residents, tenants, or tourists find appealing about the area. Maintain these qualities and strengthen the visual character of the area and its surroundings through preservation, new construction or renovations. Elements such as street trees, architecture, construction materials, street signs or setbacks all contribute to a sense of character and scale and, therefore, a more inviting pedestrian environment.

## **PRIORITY OF IMPLEMENTATION**

Communities face tough decisions about the best use of limited capital improvement funds. This section includes policies to guide investment priorities.

### **Use these policies and guidelines to prioritize capital improvement program investment.**

A basic premise of these guidelines is that all pedestrian facilities should be designed to be safe; and that these facilities should be located where ever people walk. This concept should be used to guide priorities in the capital budget process. Determining if a facility is safe and available where people walk can be accomplished through the application of the roadside conditions and latent demand analysis included in the Design Guidance section of this document.

### **Create public-private partnerships to plan and fund linking pedestrian/bicycle networks to a regional off-street systems.**

Projects that have strong public/private support should be viewed as high priority for funding. Over the past decade, the Maricopa Trail, West Valley Rivers Recreation Corridor, Central Arizona Project Canal, Indian Bend Wash, SRP operated

canals, Rio Salado, and power and gas line corridors have been identified by Maricopa County and the cities and towns within the County as well as civic organizations, such as Valley Forward Partnership, as regional assets. These entities have taken steps forward to create partnerships and coordinate and connect these and other open spaces, canals, washes, rivers, and other corridors for key regional shared use trails. A final step in the effort to make the region more pedestrian friendly is to recognize the non-recreational pedestrian destinations to these regional routes and connect them, through on-street and other systems, to regional commercial, residential and entertainment destinations.

## **COMMUNITY PARTICIPATION**

This section describes events that can be sponsored by a municipality, civic or neighborhood organizations or private entity such as a hospital or health clubs to foster a greater sense of community and encourage people to get out, walk, and discover their neighborhood on a level other than the automobile.

### **Encourage or sponsor community and other walking events.**

Encourage frequent community events co-sponsored by merchants, with pedestrian activities such as street entertainers, vendor carts and sidewalk sales. Types of events can include walking tours of the neighborhood, block parties, cuisine festivals, cultural awareness, or charity tournaments/races.

Although the Victoria, Canada International Walking Festival name is relatively new, the event itself has been in existence for seven years under its former umbrella name, Victoria International Blossom Walks. The Victoria International Walking Festival is one of 22 world-class walking festivals sanctioned by the International Walking Association (IWA), formerly known as the International Marching

League (IML). Vancouver, Washington sponsors an annual Discovery Walk, now in its seventh year. These types of events, in addition to raising awareness of walking, contribute to increasing the visibility of the region and attracting tourist dollars.

### **Compete for and achieve peer recognition of the region's efforts to enhance the pedestrian environment.**

The City of Tallahassee, Florida is in its second year of offering awards to recognize local businesses, developers, educational institutions, government agencies, and individuals for creating pedestrian- and bicycle-friendly places in Tallahassee and Leon County. Awards are offered in seven categories. Awards for pedestrian projects and facilities are also offered by the Institute of Transportation Engineers, America Walks, and some state departments of transportation.

### **Encourage cultural institutions such as museums, restaurants and nightclubs to locate within walking distance of one another.**

Museums, art galleries, symphony halls, and theatres create a wonderful level of activity before and after performances and during intermission. Integrating these uses with destination pedestrian facilities and supporting uses such as a restaurant, boutique or coffee house can contribute to the creation of an active and vibrant pedestrian environment.

Enhance the cultural 'feel' of the area and increase the interest of the walking environment by using interpretive signs and brochures to educate visitors and tourists about buildings, history, views, and landmarks that are valuable to the area.

## **PEDESTRIAN EDUCATION**

This category addresses ways to improve pedestrian safety, comfort, and destinations through additional knowledge.

### **Conduct a public education campaign.**

Create a speakers bureau to educate people about the benefits of walking and safe walking habits. Use the How-To pages in these guidelines to learn how to set up a speakers bureau.

Through the "safe route to school program" create walking buses and other activities that can be used to educate school children about the preferred route and general safety. Use the How-To pages in these guidelines to learn more about organizing a "Safe Route To School" program.

Participate in regional safety forums similar to the one sponsored by the Pima Association of Governments in Arizona.

Create walking clubs that identify barriers to walking in a neighborhood and explore ways to dissolve those barriers. The barriers may include unreadable bus schedules, proper use of crosswalks, lack of maps or readable signs, and major sidewalk gaps. The International Volkspport Walking Organization has clubs in Mesa and Surprise. These clubs organize events that encourage walking<sup>19</sup>.

### **Enhance elected official knowledge of pedestrian issues and the need for pedestrian facilities.**

Elected officials are one of the pedestrian's best allies, and community change often starts with one elected official. With their support and understanding, funding for designing and installing safe, comfortable, and destination pedestrian

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<sup>19</sup> (<http://walking.about.com/gi/dynamic/offsite.htm?site=http://www.ava.org/>)

facilities is often quicker and easier to obtain. Educate your elected officials about the importance of facilities for pedestrians by asking them to speak at pedestrian events, featuring them in newsletters about pedestrian concerns, and meeting with them individually.

### Resources

#### ***MAG Transportation Safety Action Plan***

<http://www.mag.maricopa.gov/detail.cms?item=2226>

#### ***Safety Conscious Planning Workshop***

<http://www.mag.maricopa.gov/detail.cms?item=2845>

***Train the Trainer Workshop for School Crossing Guards, MAG Safety Forum Reports (2000, 2002, 2003, 2004)***





## DESIGN PRINCIPLES

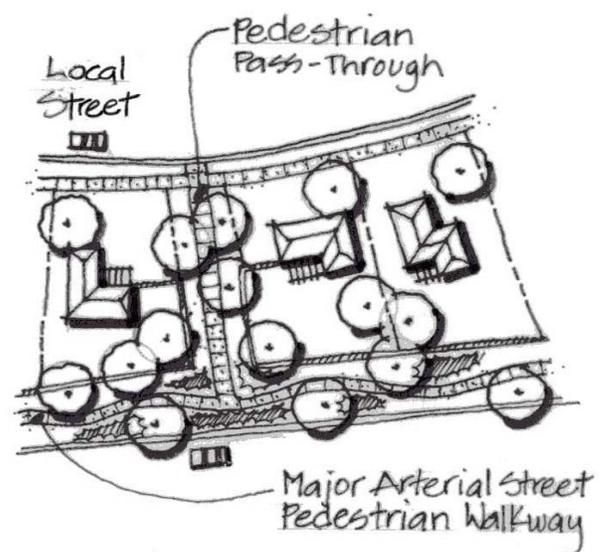
All design projects begin with planning, whether a master planned community or an improved sidewalk connecting existing uses in a downtown area. This category describes planning design principles which are necessary to encourage or allow pedestrian areas to develop or renovate. Concerns such as neighborhood character, scale of development, and decisions that shape infrastructure during the planning phase of a project are discussed in the following sections.

### Connections

**Interconnect pedestrian destinations such as parks, trail systems, transit stations, bus stops, and entertainment.**

The logical extension of improving utilitarian and tourist pedestrian areas is to link them with other areas that receive intense recreational pedestrian use, such as parks, canals, and natural areas. The linkages should incorporate the same concern for pedestrian safety and comfort as a pedestrian area. While the region has taken tremendous strides to create pedestrian connections within and between communities, linkages between pedestrian areas in the MAG region need to continue to be strengthened.

There are many opportunities to create linkages where none are planned or currently exist. Many communities now require 'back doors' between subdivisions and commercial areas that are open during the daytime. This reduces the walk time to service retail uses for nearby residents. Communities are also providing 'pass-throughs'



*Pedestrian connections to pedestrian routes.*

between cul de sacs, perimeter fencing and arterial and collector streets, and adjacent commercial land uses which also encourage walking by reducing trip length.

### **Plan land use according to the 10-minute (0.25 mile/0.4 km) walk rule.**

The 10-minute walk rule is based on research that states most pedestrians will walk up to ten minutes to reach a destination<sup>20</sup>. Ten minutes equates to a one-third to one-half mile walk. In this region, most commercial developments are located at arterial intersections which are spaced one mile apart. Since not all services generally required by the consumer are located in one retail center, it is necessary to fill some service needs at one retail center and then drive to the next to find another service. The development of a compact walking-scale district that is guided by the ten minute walk rule could encourage walking more than providing large, single-use retail developments at the fringes of the community.

Recognizing the 10-minute walk rule provides a framework for planning pedestrian areas. Shopping areas where walking is desired should locate most, if not all, development within an area that is up to one-half mile wide. Combined parking areas could be located up to one-quarter mile apart as opposed to surrounding the buildings, enhancing the safety and quality of the pedestrian environment. Rear lot pass-throughs between residential areas and commercial uses should be provided to shorten the distance a pedestrian needs to walk from home to shopping. Openings in perimeter walls should be provided to reduce the walk between home and transit stops.

This concept is also appropriate for infill and redevelopment projects because it encourages

a more compact and efficient use of existing land and infrastructure.

Another way to implement the 10-minute walk rule is through mixed use or new urbanist development. These developments recognize that people can live, work and play within a relatively compact environment. It uses the concept of 'stacking' land uses; for example, placing residential or office development over retail uses creates a sense of activity and excitement at the street level. New urbanist development is based on a charter that describes the variety of developments and factors it considers<sup>21</sup>.

Developments that implement the 10-minute rule and support transit are called *transit oriented development (TOD)*. TOD is development that occurs within 1/2 mile of a transit stop, is linked to a network of walkable/bikeable streets, contains a rich mix of uses - retail, residential, workplace and has appropriate treatment of parking and densities appropriate to its setting<sup>22</sup>.

The 10-minute rule also applies to community design. Residents should be able to walk no more than ten minutes to a neighborhood park, retail center, or transit stop.

### **Provide walkways adjacent to roadways, but separate from the curb whenever possible with landscaping, a bicycle lane, or on-street parking.**

The regional arterial street system is an arterial and collector street grid system. Most retail and employment development, community facilities, and destinations are located along the arterial and collector grid. Because many arterial streets provide sidewalks that meet some minimum safety standards, the arterial grid system is useful as a transportation corridor for pedestrians. This design

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<sup>20</sup> (Guide for the Planning, Design and Operation of Pedestrian Facilities, AASHTO. June 2004.)

<sup>21</sup> ([http://www.cnu.org/aboutcnu/index.cfm?formAction=charter.](http://www.cnu.org/aboutcnu/index.cfm?formAction=charter))

<sup>22</sup> (<http://www.reconnectingamerica.org/html/TOD/index.htm>)



*Parked cars provide a buffer for pedestrians.*

principle encourages enhancing the safety and comfort of these pedestrian facilities by separating the sidewalk from the roadway. Often, this separation can be accomplished without sacrificing other safety considerations, such as providing median refuges, by narrowing or removing lanes, adding bicycle lanes or on-street parking.

In addition to separating pedestrians from the roadway, walkways should be provided during the initial development of a road. Because this region is developing quickly, often development is not contiguous. As a result, as development occurs, there are often gaps in the walkway. A pedestrian travelling from one development to another is consequently forced onto the roadway in areas between developments with no sidewalk or pedestrian walkway. To address this, walkways should always be provided adjacent to all roadways. These walkways can be stabilized surfaces or a paved path, but they must be designed to be separated from the roadway and safe.

**Design master planned communities and subdivisions as a collection of multiple smaller neighborhoods, interconnected by a pedestrian and bicycle network.**

Within the mile grid of the regional transportation system rests a myriad of subdivisions and master planned communities. Each of these developments

can be designed around or include centrally located public facilities such as schools, parks, churches, and shopping. These public facility cores should be linked with safe pedestrian facilities to the surrounding residential areas.

**Connect the pedestrian system with safe and comfortable facilities to other non-motorized and public transportation systems, taxi service, and airport shuttles.**

Once a bicycle ride or trip on public transportation ends, users become pedestrians until they reach a final destination – be it home, car, work, or other location. By connecting the pedestrian network to other regional systems it makes it easier for people to transition between bicycles, busses, and walking, thereby lessening auto dependence.



*The entrance to the library is near the greenbelt.*

**Recognize and maintain access to off-street opportunities for safe and comfortable pedestrian facilities including canals, washes, rivers, and alleys.**

The MAG region is fortunate to have an excellent and widespread system of canals, washes, rivers, and alleys that can provide alternate, secondary and unique experiences for pedestrians. These features provide an excellent location for safe and comfortable pedestrian facilities. Some of

these features traverse existing and planned commercial areas and provide additional opportunities for destination facilities for pedestrians.

### **Pedestrian Places**

**Encourage people to walk by creating places that use land use, destination pedestrian facilities, and economic and cultural activities to establish walking as a primary or secondary activity.**

Creating places where walking is encouraged as a primary or secondary activity will attract people who want to walk and will encourage others who may come to that location for another reason, to also walk. These places can be created by locating cultural institutions such as museums in core areas within walking distance of one another and encouraging sidewalk vendors such as newsstands, food and craft carts to supplement existing retail or fill-in vacant spaces between land uses.

Another way to get people outside of their immediate destination is to make the surroundings interesting. This can be done by establishing and reinforcing the existing character of an area and its surroundings through special district Codes, Covenants & Restrictions (CC&R's), and distinctive landscaping. Establish cohesive architectural guidelines to guide site development and site planning. Use street trees, architectural lighting, signs, furnishings, and accent paving along the pedestrian routes to establish and emphasize a theme. Celebrate the cultural aspects of an area through interpretive signs, festivals, farmer's markets, parades, art fairs or other events.

### **Traffic Calming**

**Use techniques to enhance the awareness of pedestrians by vehicular drivers.**

If a driver is moving more slowly, they have more time to understand and interpret the surrounding environment. For example, a driver of a slower moving vehicle has more time than the driver of a fast-moving vehicle, to see a ball enter a street and anticipate that a child or dog may follow it, or to anticipate someone crossing mid-block.

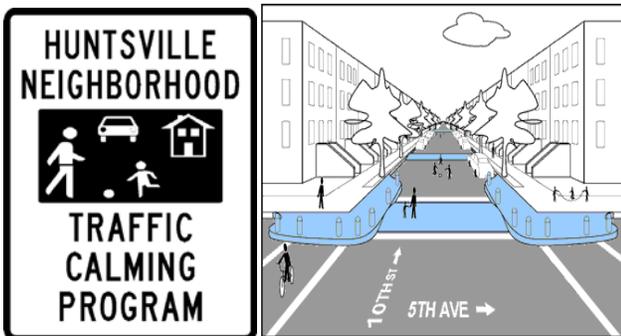
The concept of traffic calming, or methods to slow traffic, has been developed over the past 30 years. These techniques have been used extensively in England, Germany, and the Netherlands to reduce speed, accidents, noise, pollution, and congestion. Traffic calming techniques have also made neighborhoods more livable. Adaptation of these techniques to U.S. cities where vehicular use is higher is most common on the West Coast. While most people are familiar with speed humps, other techniques have also been developed such as channelization (used to separate intersecting, diverging, merging, weaving, and turning movements), slow streets, transit street, speed tables, traffic diverters (that prevent certain through and turning movements), corner radii reduction (which reduces the area within which



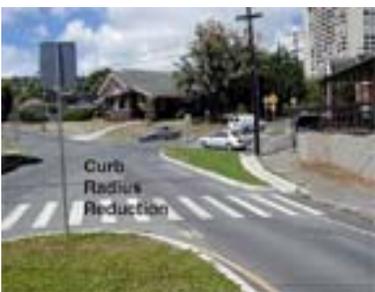
*Speed tables slow traffic.*



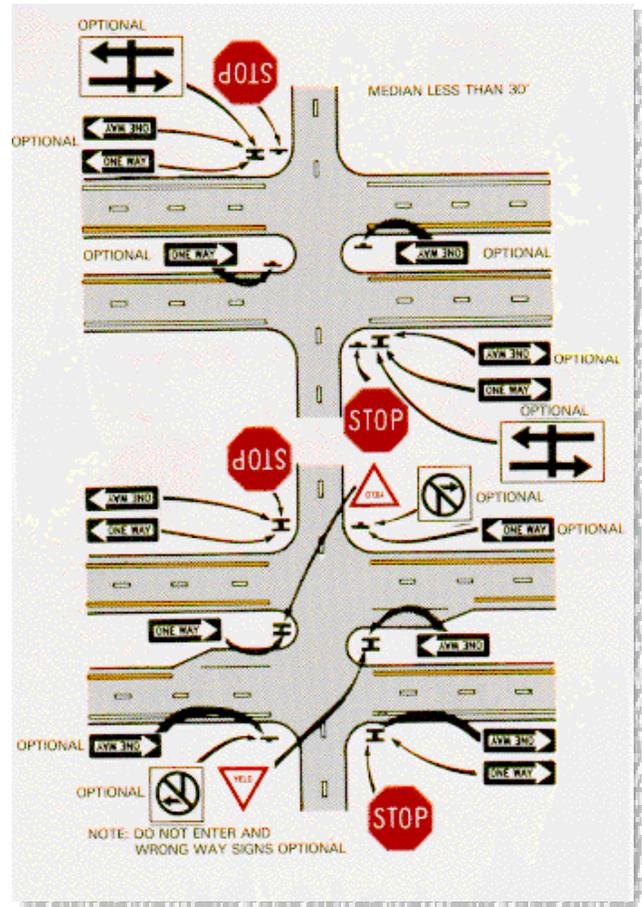
Chicanes. (<http://www.rolog.ch/images/realisation/P103.JPG>.)



Slow Streets is a programmatic approach using a variety of techniques to slow traffic through a neighborhood. These images show using speed humps and curb bulb outs to reduce traffic speeds. (<http://www.transalt.org/campaigns/nsn/images/10thand5thbrooklyn.gif>)



Curb radius reduction in Linden, Ohio. (<http://linden.morpc.org/images/modifiedint2.jpg>.)



Traffic Channelization. (<http://www.ctre.iastate.edu/educweb/ce352/lec05/channel.gif>.)



Traffic Tables. (<http://www.students.bucknell.edu/projects/trafficcalming/Library/Raised%20XWbig.jpg>.)



Traffic Diverter in Sarasota Florida. (<http://www.sarasotagov.com/InsideCityGovernment>.)

a car can turn the corner, hence requiring a slower speed to complete the turn), chicanes (used to narrow the street and create choke points), traffic circles, and signing improvements.

Traffic calming is most helpful at improving safety and improving residential and shopping environments and directly reduces the speed of vehicles through physical improvements. Use of these techniques should be a part of an established hierarchy in the street system.

However, traffic calming is not the sole solution to managing traffic for the benefit of pedestrians and neighborhoods. Prior to installing these types of devices, data collection to determine traffic volumes and speeds should be collected to determine if they will be effective. In addition to impacting through-traffic, traffic calming techniques also impact local residents driving habits. These impacts must be evaluated in terms of who will be affected and if the benefits from traffic calming justifies the local inconvenience it may cause.

### **Provide pedestrian crossing signs or other features at unexpected crossing areas to increase driver awareness.**

Pedestrians cross where it is most convenient. Sometimes the most convenient location is unsafe because it is unexpected by or not highly visible to a moving vehicle. While there is still debate regarding if the pedestrian should be accommodated or not at undesired crossings (the thinking is that any amenities will encourage pedestrian



Pedestrian barriers are used in London to prevent mid-block crossings. ([http://safety.thwa.dot.gov/ped\\_bike/univcourse/swless23.htm](http://safety.thwa.dot.gov/ped_bike/univcourse/swless23.htm).)

crossing where it is not desired), these guidelines recommend where pedestrian crossings are desired, provide signs, striping, pavement textures or other signals to drivers to make them more aware of their environment. This will also enhance pedestrian safety and provide facilities to make the crossing attractive to the pedestrian. Where pedestrian crossings are not desired, discourage the pedestrian by using signs and/or barriers (such as fencing or horizontal separation) and alert drivers through techniques such as signs, changes in pavement texture, and lighting that pedestrians may cross unexpectedly. It should be noted that any proposed traffic control devices need to meet the warrant criteria of the MUTCD.

## **Landscape**

### **Use native, drought tolerant plants and landscape areas wherever possible to soften the hard edges of the built environment and increase pedestrian comfort.**

Convert drainage areas and odd lots adjacent to pedestrian areas and nodes in to small landscaped spaces. Residents or adjacent business owners can be encouraged to plant and maintain street trees or provide other shade elements. Landscape

should only be provided if there is a commitment to its long term maintenance.

### **Minimize the amount of unused or dead space within the pedestrian environment.**

Spaces between buildings, vacant lots, obsolete or vacant buffer areas or median strips reduce the safety, comfort, and destination aspects of a pedestrian environment. Examine the pedestrian environment for areas that can be developed into active spaces that enhance the pedestrian experience. For example, vacant lots and spaces between buildings or remainder areas of right-of-way provide the opportunity to create pocket parks and plazas that foster social interaction among pedestrians and can provide a resting place and a respite from the built environment.

## **Site Planning**

### **Establish separate pedestrian routes within a site and between sites to reduce walking distances and enhance pedestrian safety.**

Reducing barriers between sites and land uses can reduce the distance walked by pedestrians. Often pedestrians must use the street and walk around a wall or landscaping that is placed on property lines to prevent through vehicular traffic.



*This vacant corner was turned into an active plaza through the use of landscaping, benches, and kiosks.*

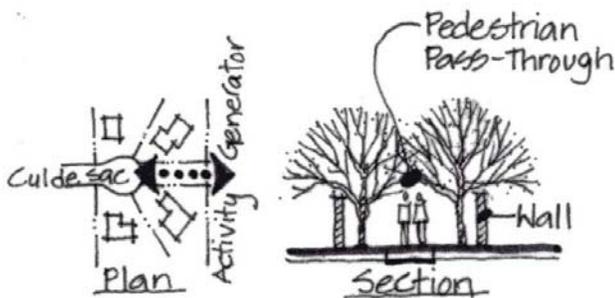
Because pedestrian facilities often follow roadway facilities, pedestrians are required to walk additional distances to entrances that are primarily designed for vehicular safety. Providing diagonal access for pedestrians at street corners into commercial, employment, office, and public land uses that are not blocked with walls or landscaping can reduce the distance of the pedestrian trip. Within a site, internal pedestrian circulation systems that are separated from those designed for vehicles can help to avoid vehicle/pedestrian conflicts. On larger sites, or in corridors where several pedestrian areas are connected, implementing a shuttle service should be considered to reduce the distance of pedestrian trips.

### **Develop safe, shared-use path systems along washes, canals, utility corridors, alleys, in the spaces between buildings and along other linear ways.**

Planning walkways along these features increases the number of loops or opportunities within the pedestrian network system. These features also provide for areas where the pedestrian can be separated from vehicular traffic. It is important to note that these areas are sometimes isolated or may only support low intensity pedestrian activity. To keep these areas safe and secure, keep them visible to the occupants of the buildings on the site and consider foot patrols, cameras, lighting, and emergency phones along the routes.

### **Provide easements at cul-de-sacs to link pedestrian areas with activity generators and transit stops. In gated or walled communities, establish pass-throughs with lockable gates at ¼ mile (0.4km) intervals to destinations such as other residential areas, transit stops, parks and trails, and neighborhood shopping.**

Cul-de-sacs are appealing to subdivision designers because they create a sense of safety and security from traffic. Coincidentally, this often results in a circulation network that is inconvenient and unworkable for pedestrians. Providing pedestrian pass-throughs at cul-de-sacs will enhance pedestrian mobility and contribute to a more walkable community. See *Reconsidering the Cul-De-Sac* by Michael Joseph and Eren Ben Joseph, April 2004, for more information on this topic.



*Pass-throughs provide pedestrian access.*

### **Locate primary retail entrances adjacent to pedestrian routes along the street with parking behind or to the side of the building.**

Connecting destinations to places where people walk will enhance the potential for pedestrian activity. Instead of separating entrances from pedestrian areas (such as sidewalks, plazas, parks, and transit stops or stations) by parking areas, locate retail entrances close to places where people walk.

## **Architectural Design**

### **Design buildings and places that are human scaled.**

Tall buildings with large entrances, windows placed above a pedestrian's line of sight, and ornamentation that is larger than a person all make people feel

smaller. When a space is too large to understand or control, people begin to feel unsafe. Appropriately scaling buildings to a person can enhance their feeling of size and safety. This can be done by providing a high proportion of openings (windows and doors) in the building facade, as opposed to blank walls. Provide transparent windows that block the sun while allowing the passerby to see inside the building. In retail areas, entrances to stores should be no more than 35 feet apart with display windows between entryways to reduce blank walls and add light and vitality to the street.

## **Signs**

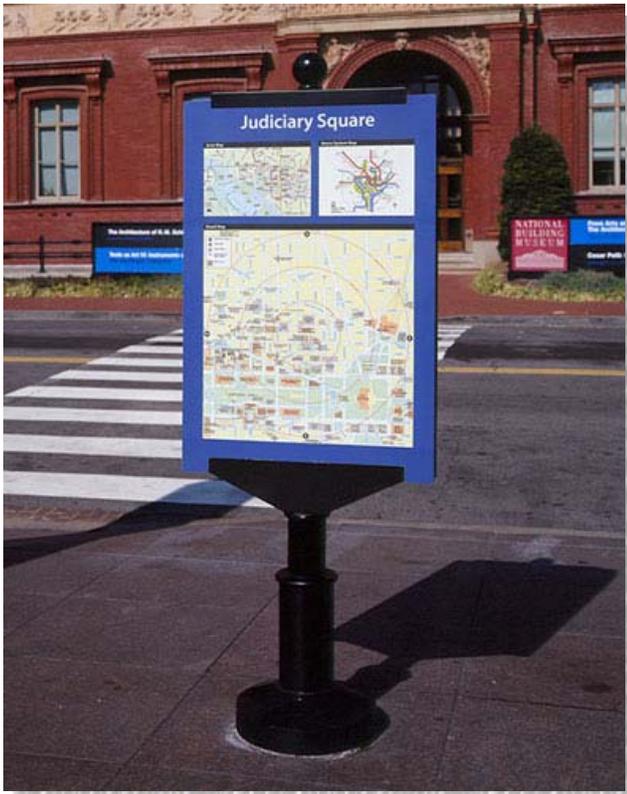
### **Design signs, first, to provide information and directions, and second, to create a thematic or design character function.**

Provide directional signs to guide the public to pedestrian areas from transportation systems such as transit routes, freeways, and airports. Provide for out-of-state and international visitors and tourists by using an international sign marking system. Within pedestrian areas, use signs to guide pedestrians to features and amenities such as restrooms, public phones, public plazas, and major destinations. In these locations, sign design should reflect and strengthen a local design theme or character.

## **Bicycle**

### **While this document focuses on the pedestrian, bicyclists often use the same areas and need to be acknowledged.**

Bicycles travel at faster speeds than pedestrians. While they are much more maneuverable than motorized vehicles, bicycles still need adequate stopping and maneuvering distances to help them avoid unanticipated pedestrian activity. Strive to place bicyclists and pedestrians on separate



This sign in Judiciary Square, Washington D.C. provides extensive information on area sights and wayfinding. (<http://www.azasla.org/articles%202002/images/Washington%20402.jpg>.)

safe, facilities. If a separate facility is not provided for bicyclists, increase the width of the pedestrian area to a minimum of 10 feet to allow adequate room for the bicycle safely to pass a pedestrian. However, on-street or separate bicycle facilities should be provided in areas that have wide sidewalks to accommodate high levels of pedestrian activity. Provide convenient bicycle parking areas that do not interfere with pedestrian activities or routes. Provide bicycle racks or lockers at convenient locations adjacent to major destinations, commercial, office, and retail centers.

**Where shared-use pedestrian/bicycle access is adjacent to, but not in conflict with, pedestrian routes or corridors, provide a minimum 10-foot wide shared-use pathway.**



These bicycle racks are provided outside of the pedestrian right-of-way adjacent to a building entrance.

Wide shared-use pathways reduce the potential for conflicts between bicycles and pedestrians. For shared-use pathways, AASHTO recommends a minimum of 10 feet.

### Transit Interface

**Locate transit stops adjacent to walkways at 1 mile (1.6 km) intervals in rural areas, and 1/2 mile (0.8 km) or less in developed areas on arterial streets.**

Because they are more difficult, split mode trips (trips requiring more than one transportation mode) are less desirable than single mode trips. By placing transit stops within walking distance of people and connecting people to them with safe and comfortable facilities, the potential for combining a car and a transit trip is reduced. This may include pedestrian easements between gated communities and transit stops.

**Design transit centers to be pedestrian friendly.**

To reduce auto trips, it is key to make intermodal transfers between bus and light rail seamless, safe, and comfortable. One way that this can

be done is to co-locate bus stops and bus terminals with light rail stations, minimizing the distance that a traveler needs to walk between these two travel modes. Additionally, locating these transit centers in areas where other services are nearby can further reduce trips by enabling the rider to conveniently attend to errands or shopping needs without having to make a separate trip.

### **Maintain visual connections from the light rail platform to exits, connections to other modes, and potential destinations.**

In our region, light rail stops are raised platforms located in the middle of the right of way. They are accessed from crosswalks at the intersection. Once exiting the train, the traveller is a pedestrian. Visual connections between the platform and destinations, other modes of transportation, and the station will help the pedestrian to more quickly understand the environment, and make them feel safer and more comfortable.

### **Change paving textures and color to signal light rail platform entrances and edges.**

Pedestrians with low vision may have trouble identifying exactly where the mid-street entrance to a station is located. Changes in paving texture can assist by providing another cue that denotes an entry into the station. Refer to ADAAG guidelines for further information.

### **Use barriers and signs to alert drivers and pedestrians that only designated entries are safe to access the rail platform.**

This principle addresses the potential that someone who wants to get to the station more quickly will cross mid-block and 'jump' onto the platform, potentially getting caught between the train and oncoming traffic.



*This light rail station is planned at Campbell and Central Avenues in Phoenix, Arizona. (<http://www.valleymetro.org/rail/StationDesign/1Campbell%20and%20Central%20Avenue.html#TopOfPage>.)*



# IDENTIFY PEDESTRIAN FACILITY NEED

## BACKGROUND

The *Maricopa Association of Governments Pedestrian Plan 2000* includes two tools to help assess where pedestrian facility improvements are most needed in the MAG Region and specific recommendations that would create a greater sense of pedestrian comfort. These tools were expressed as roadway design performance guidelines and quantified through the following models:

- *Pedestrian Latent Demand Model*
- *Roadside Pedestrian Conditions Model*

The models provide statistical support to what can sometimes seem intuitive. In instances where statistical support is helpful or required to justify spending on pedestrian improvements, the models can be deemed critical. However, the logarithmic models can be considered complex and are best understood by engineers that routinely perform this type of work. Other projects may be justified by using a more intuitive approach to determine priorities and degrees of pedestrian accommodations. Still others may require no justification; decision makers need only be directed to guidelines that fit their particular location and condition.

## DECISION MAKING SCENARIOS

This section provides three decision making scenarios when determining pedestrian facility need.

- 1) When to use the models as presented in the *Pedestrian Plan 2000*
- 2) When to use an intuitive approach
- 3) When to simply make a determination of your condition, and then design accordingly

One methodology is provided for assessing project priority for Scenarios #1 and #2.

**Scenario 1) When statistical verification is required to support a pedestrian improvement priority and/or a level of pedestrian accommodation:**

*Apply the Pedestrian Latent Demand Model and the Roadside Pedestrian Conditions Model and apply the corresponding level of pedestrian accommodation corresponding*

to: **Safety, Comfort or Destination** as defined in this document.

The **Pedestrian Latent Demand Model** estimates potential pedestrian activity along segments of roadway corridor, based upon the frequency and proximity of adjacent trip destinations or attractors (parks, schools, employment and trailheads) and origins or generators (residential). The model uses much of the same socio-economic data as that used in motor vehicle and transit travel forecasting, but with adjustments based on specific travel characteristics of the pedestrian. It provides a tool to decisions makers on where to focus limited resources on improving pedestrian conditions.

The model assumes that there are no constraints to pedestrian travel other than distance, applying an “if you build it they will come” philosophy to determining potential pedestrian activity within an area. Both existing and future conditions were analyzed. Data inputs for the modeling analysis include the following:

- *land use, particularly the mix (if any) of residential densities, retail, office, public, quasi-public, industrial, etc.*
- *public schools and universities*
- *public parks*
- *urban trails*
- *population density*
- *income level*
- *employment values within MAG’s traffic analysis zonal data*
- *age demographics*

For the future land use scenario, existing urban features were analyzed along with future population and employment projects as anticipated in MAG’s 2020 land use zonal data sets.

The **Roadside Pedestrian Conditions Model (RPC)** assesses how well existing roadside conditions satisfy pedestrian needs, thereby creating a sense of pedestrian comfort. The outcome is stratified

into a “level of service” grade from A to F, with A being the best conditions for pedestrians and F representing the worst. The model looks at roadway, traffic and pedestrian conditions and incorporates many of the pedestrian principles from the 1995 *Pedestrian Policies and Design Guidelines* into its evaluation. Data inputs include:

- *lateral separation between pedestrians and motor vehicle traffic (including the presence, and width of sidewalks)*
- *amount and speed of motor vehicle traffic*
- *percentage of heavy vehicles (trucks)*
- *number of travel lanes*
- *presence of a paved shoulder, bike lane, or on-street parking*
- *width of buffer between sidewalk and roadway*
- *trees or other “protective” barriers in the buffer*

The level of service grade can be applied to both the existing and the desired roadside condition. For instance, if the existing conditions rated a C, a community could desire a grade of A, and specific improvements are recommended to achieve this higher score. Tables were provided that identified different buffer widths and tree spacing based upon the other road and traffic factors. These two factors: separation width and the barriers within that width were identified as the primary factors that can be manipulated outside the traffic zone in creating a pedestrian sense of comfort in a roadside condition.

The two models were tied to the 1995 *Pedestrian Policies and Design Guidelines* in the following two ways:

1) The **Latent Demand Model** was equated to the four “area types”:

- **District** = Highest latent demand (Score of 100% to 80%)= areas of high intensity with a wide variety of land uses with a regional appeal

- **Campus** = Second highest latent demand (Score of 79% to 60%) = high intensity areas with a single or limited mix of land uses
- **Community** = Third highest latent demand = areas of low to medium intensity
- **Neighborhood** = Fourth highest latent demand = areas of low intensity with a limited mix of land uses

2) The **Roadside Pedestrian Conditions Model** was equated to Pedestrian Latent Demand:

- Pedestrian **Level of Service A** = highest latent demand = **District**
- Pedestrian **Level of Service B** = second highest latent demand = **Campus**
- Pedestrian **Level of Service C** = third highest latent demand = **Community**
- Pedestrian **Level of Service D, E & F** = fourth highest latent demand = **Neighborhood**

Specific pedestrian improvements were then tied to what was recommended for each of the area types and the levels within them.

The two models which are available through MAG should be tied to the *Updated Pedestrian Policies and Design Guidelines* by running the models for a particular area and applying as follows:

- **Destination** = Highest latent demand (Score of 100% to 80%) = **Level of Service A** = areas of high intensity with a wide variety of land uses = downtowns, major university campuses, areas around large regional shopping malls, newly built “town centers”
- **Comfort** = Second highest latent demand (Score of 79% to 60%) = **Level of Service B** = high intensity areas with a single or limited mix of land uses

- **Safety** = Third highest latent demand (Score 59% or lower) = **Level of Service C, D, E or F** = areas of low to medium intensity with little to no mix of land uses

These guidelines would apply to major streets, other lower classified streets within the general area for which the model was run as well as non-vehicular corridors (latent demand application only). Recommended setback widths in the Roadside Pedestrian Condition Model will likely be greater than what is recommended in this document. Any project must consider available right-of-way width, building setback and other site specific considerations, and provide as much lateral separation as possible.

**Scenario 2) Where the degree of modeling sophistication is not required to determine or justify a project priority or level of pedestrian accommodation, but the type of appropriate pedestrian improvements or priority is not clear:**

*Apply the intuitive approach to determine Pedestrian Latent Demand and the Roadside Pedestrian Conditions then apply the level of pedestrian accommodation corresponding to: **Safety, Comfort or Destination** as defined in this document.*

When both the existing and future scenario latent demand maps are reviewed, the results are not surprising. Areas of highest population density and with the greatest mix of uses have the highest pedestrian latent demand and those areas with lowest density and single land uses have the lowest latent demand. The models quantify what seems predictable. The following process can be used to match pedestrian accommodations to an anticipated level of pedestrian activity.

The data inputs used in the formal Latent Demand Model outlined above can be simplified into matrix form to determine latent demand in the project

area. Additional characteristics have been added to reflect the expanded scope of these guidelines. The project’s score is then equated to guidelines associated with safety, comfort and destination. The scoring breakdown is comparable to the percentage breakdown for the Latent Demand

Model identified in the *Pedestrian Plan 2000* with an 80% of the total possible score equating to the highest latent demand, 60% -79% representing the next highest and 59% and less representing the lowest.

***Intuitive Approach Latent Demand Assessment***

<b><u>Characteristic</u></b>	<b><u>Variable within the TAZ</u></b>	<b><u>Score</u></b>
<b>1) Land Use Mix</b> (residential densities, retail, office, public, quasi-public, industrial, other. Agricultural and inaccessible open space not counted as a land use)	5 or more land uses	+3
	2-4 land uses	+2
	1 land use	+1
	Agricultural or inaccessible open space	+0
<b>2) Public schools and universities</b>	4000+ students	+3
	1500-3999 students	+2
	<1499 students	+1
	No schools	+0
<b>3) Public facilities</b> (libraries, city hall community centers, etc.)	3 or more facilities	+3
	2 facilities	+2
	1 facility	+1
	No facilities	+0
<b>4) Public parks</b>	Regional park	+3
	Community park	+2
	Neighborhood park	+1
	No parks	+0
<b>5) Urban trails and bikeways</b>	Regional trail or bikeway	+3
	Community trail or bikeway	+2
	Local trail or bikeway	+1
	No trails or bikeways	+0
<b>6) Population density (dwelling units per acre)</b>	8+ DU/AC	+3
	4-8 DU/AC	+2
	<4 DU/AC	+1
<b>7) Income level (annual household)</b>	<\$18,600	+3
	\$18,600-\$42,300	+2
	\$42,300 or more	+1

8) Age Demographics	Area has many young and/or many older pedestrians	+3
	Area has average numbers of young and/or older pedestrians	+2
	Area has few young and/or older pedestrians	+0
9) Bus stop	More than one	+3
	One	+2
	None	+1
10) Employment values within MAG's traffic analysis zonal data (jobs per square mile)	4,000 or more	+3
	1,500-4,000	+2
	<1,500	+1
11) Trailheads and park and ride lots	>100 parking spaces	+3
	50 to 99 parking spaces	+2
	<50 parking spaces	+1
	No trailheads or park and ride lots	+0
12) Bus or light rail transit station	Bus and light rail transit station	+3
	Bus or light rail transit station	+2
	No station	+0
13) Light rail transit stop	More than one	+3
	One	+2
	None	+0
14) Bus stop	More than one	+3
	One	+2
	None	+0
<b>TOTAL PROJECT SCORE</b>		
maximum score		42
minimum score		3

- **Score of 29-42 = Destination** = Highest latent demand = areas of high intensity with a wide variety of land uses with = downtowns, major university campuses, areas around large regional shopping malls, newly built "town centers"
- **Score of 22-28 = Comfort** = Moderate latent demand = high intensity areas with a single or limited mix of land uses =
- **Score 3-21 = Safety** = Low latent demand = areas of low to medium intensity with little to no mix of land uses

These guidelines can apply to any pedestrian project whether along a street or non-street corridor, within MAG Traffic Analysis Zones.

Similar to Scenario #1, determination of both latent demand and current or desired roadside pedestrian condition can help determine project priorities. The following table provides an intuitive methodology for determining roadside pedestrian level of service. The data input is comparable to those used in the Roadside Pedestrian Conditions Model discussed in Scenario #1. The scoring

breakdown is comparable to the percentage breakdown for the Roadside Pedestrian Conditions Model identified in the *Pedestrian Plan 2000* with a 73% of the total possible score equating to the best conditions for pedestrians and < 18% of the score representing the worst conditions for pedestrians.

***Intuitive Approach Roadside Pedestrian Condition Assessment***

<u>Characteristic</u>	<u>Variable</u>	<u>Score</u>
1) Amount of motor vehicle traffic	< 10,000 Average Daily Traffic	+3
	10,000 to 17,500 ADT	+2
	17,501 to 30,000 ADT	+1
	> 30,001 ADT	+0
2) Posted speed of motor vehicle traffic	< 30 mph	+3
	30-40 mph	+2
	41-50 mph	+1
	> 55 mph	+0
3) Percentage of heavy vehicles (trucks)	< 2 %	+3
	2 – 4 %	+2
	> 4 %	+0
4) Number of travel lanes	1 lane	+3
	2-3 lanes	+2
	4 lanes	+1
	6 lanes	+0
5) Presence of a paved shoulder, bike lane, or on-street parking	Paved shoulder with parking	+3
	Paved shoulder with bike lane	+2
	Paved shoulder of min. 4’ width	+1
	No paved shoulder	+0
6) Width of buffer between sidewalk and roadway	50’	+3
	11’-49’	+2
	5’-10’	+1
	< 4’	+0

7) Trees or other "protective" barriers in the buffer	<10' on-center or continuous	+3
	11'-40' on-center	+2
	41'-60' on-center	+1
	> 60' on-center	+0

<b>TOTAL PROJECT SCORE</b>		<hr/>
maximum score		21
minimum score		0

- **Score of 16-21 = Level of Service A = Destination** = the best conditions for pedestrians
- **Score of 12-15 = Level of Service B = Comfort** = above average conditions for pedestrians
- **Score of 8-11 = Level of Service C = Safety** = average conditions for pedestrians
- **Score of 4-10 = Level of Service D = Safety** = below average conditions for pedestrians
- **Score < 4 = Level of Service F = Safety** = worst conditions for pedestrians

Level of service is not static. An assessment is only a snapshot of current conditions and records whether an area provides any level of pedestrian accommodation. A determination is left to decision makers if that Level of Service is appropriate for existing and planned conditions at the site, or if the site needs to be improved to achieve a higher level of service.

**Project Prioritization in Scenarios #1 and #2**

Prioritizing projects can be accomplished where needed through either the formal models or the intuitive assessments. Once a level of service and a latent demand is defined for a project, its relative priority can be decided. Pedestrian latent demand is expressed in the following table using the terminology of these updated policies and guidelines; safety, comfort and destination.

This prioritization guideline assumes that projects that have low pedestrian potential and are currently scoring a level of service A should be of a low priority. Most likely, the project area meets the minimum guidelines as defined for the safety level of pedestrian accommodation. Likewise, a high priority would be given to projects within an area of high pedestrian potential that score less than a C for level of service.

Where a project currently may score a level of service C and falls within an area of moderate pedestrian potential (comfort), there may be a desire to upgrade that area through public and private improvements to become an area of high pedestrian potential (destination). In this instance, the priority level would raise from moderate to high.

### Project Prioritization

	<b>Safety</b> (low latent pedestrian demand)	<b>Comfort</b> (moderate latent pedestrian demand)	<b>Destination</b> (high latent pedestrian demand)
LOS A	Low Priority	Low Priority	Low Priority
LOS B	Low Priority	<b>Moderate Priority</b>	<b>Moderate Priority</b>
LOS C	<b>Moderate Priority</b>	<b>Moderate Priority</b>	<b>High priority</b>
LOS D- F	<b>High Priority</b>	<b>High Priority</b>	<b>High priority</b>

**Scenario 3) When a project requires no justification and decision makers need only be directed to guidelines that fit their known location and condition:**

*Choose the level of pedestrian accommodation corresponding to: **Safety, Comfort or Destination** as defined in this document.*

- **Destination** = areas of high intensity with a wide variety of land uses including downtowns,

major university campuses, areas around large regional shopping malls, newly built “town centers”

- **Comfort** = high intensity areas with a single or limited mix of land uses
- **Safety** = areas of low to medium intensity with little to no mix of land uses



## SPECIFIC DESIGN GUIDELINES

Pedestrian areas and facilities should be designed at a minimum to be safe. The following guidelines cover specific pedestrian facilities and amenities. There are items which are recommended in a facility for it to be **safe** for pedestrians (see this page). There are items that make an area more **comfortable** and more likely that pedestrians will use it willingly (see Page 48). Lastly, there are items that make an area a **destination**, a place that people will make a point to walk or bike or ride there (see Page 49).

### Safe Facility Minimums

- a **6-foot wide** walkway, visually and functionally separate from the path of vehicles
- a walkway surface that is smooth, slip-resistant and without cracks, indents, or steep grades
- clear of protruding objects
- walkways that go around driveway crossings
- all intersection corners and changes in elevation have ramps
- the walkway is physically separated from vehicular traffic by at least one vertical or horizontal element
- at least 1 footcandle of lighting at intersections and crosswalks
- pedestrian crossings with vehicular traffic have a defined crosswalk
- traffic signals are timed for a walking speed of 2.8 feet per second
- minimum 50% shade coverage along the route and at gathering nodes

**NOTE:** If the project is a new build, there are design elements that should be built to the comfortable level to meet the highest standards of ADAAG. These include driveway crossings (walkway fully behind flared and sloped portions of the driveway), directional ramps at intersections (two per corner, one for each crosswalk), approved detectable warnings at all transitions between walkways and streets, and cut-through or ramped medians.

## Comfortable Facility Minimums

- a 7- to 12-foot **wide** walkway, visually and functionally separate from the path of vehicles
- a walkway **surface** that is smooth, slip-resistant and without cracks, indents, or steep grade
- **clear** of protruding objects
- walkways are flat and straight and don't meander around **driveway crossings** and driveways crossings are limited
- all changes in elevation have **ramps** and intersection corners have curb cuts for both directions or one broad cut serving both crosswalks
- the walkway is **physically separated** from vehicular traffic by at least two vertical or horizontal element
- at least 1 footcandle of **lighting** at intersections and crosswalks and lights are spaced so there is spot to spot lighting
- pedestrian crossings with vehicular traffic have a defined **crosswalk** and may also include an activated signal, median refuge or other such element
- **traffic calming** improvements are introduced to slow vehicular speeds in appropriate areas off arterial streets
- **traffic signals** are timed for a walking speed of 2.8 feet per second, and there are walk/don't walk signs, auditory signals or other such elements
- **minimum 60% shade** coverage along the route and at gathering nodes

## Destination Facility Minimums

- **a 20-foot wide walkway, visually and functionally separate from the path of vehicles**
- **a walkway surface that is smooth, slip-resistant and without cracks, indents, or steep grade and one that adds character to the architectural theme**
- **clear of protruding objects**
- **the walkway is in an environment with a pedestrian scale and pleasing building height ratio**
- **there are no driveway crossings**
- **all changes in elevation have ramps and there are no intersections with vehicles**
- **the walkway is physically separated from vehicular traffic by at least four vertical or horizontal element**
- **at least 1 footcandle of lighting that is generally continuous**
- **pedestrian crossings with vehicular traffic have a defined crosswalk**
- **traffic signals are timed for a walking speed of 2.8 feet per second**
- **minimum 75% shade coverage along the route and at gathering nodes**
- **two to three seating opportunities per block**
- **site furnishings that could include trash receptacles, telephones, drinking fountains, or restrooms**
- **wayfinding and direction signage**
- **facilities include public art**
- **pocket parks and other planting opportunities**
- **transit stations with plenty of amenities**

## WIDTH

For a pedestrian area to be safe, it must have a defined walkway, visually and functionally separate from the path of vehicles. That does not necessarily mean paved in concrete, though to be safe, it must meet ADA guidelines for smoothness (see section on Surface/Texture).

### Safe

Provide a minimum of **6 feet** (1.8m) clear for a safe walkway width. This will accommodate pedestrians moving in both directions, as a walking person requires a minimum walkway width of 2.5 to 3 feet (0.8 to 0.9m) and a person in a wheelchair requires at least 3 feet (0.9m). Additional width should be provided if there will be landscaping or site furnishings (see the Clearance Section for additional information).

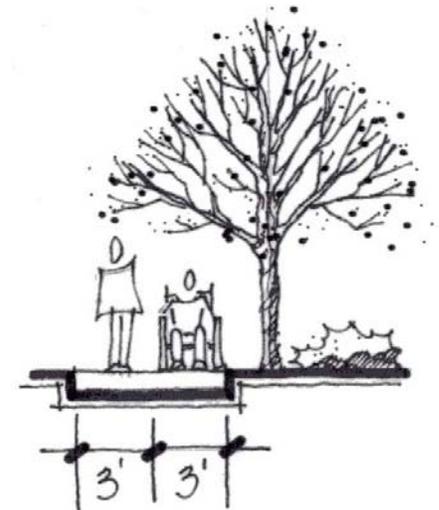
### Comfortable

Provide a minimum width of **7 to 12 feet** (2.1m to 3.6m) for a comfortable walkway for multiple users.

### Destination

Provide a minimum width of **20 feet** (6.1 m) for an effective walkway for areas that will be a destination.

Shared-use paths should be at least **10 feet** wide (3m) to accommodate a combination of walkers, bikers, skaters, and other users. Signing on shared-use paths is essential so people know to expect other types of users. Refer to the signage recommendations in the AASHTO *Guide for the Development of Bicycle Facilities*, Page 53.



Walkways should provide sufficient passing room.



Too Narrow.



8' walkway.



10' plus walkway.

## SURFACE/TEXTURE

### Resources

#### Accessible Route [4.3]

<http://www.access-board.gov/adaag/about/4.3.htm>

#### Chapter 4. Sidewalk Corridors, 4.3 Sidewalk Surfaces

<http://www.fhwa.dot.gov/environment/sidewalk2/sidewalks204.htm>

### Safe

A safe sidewalk surface should be even, without bumps, cracks or indents greater than 1/4 inch so as not to catch the tip of a cane or front casters of a walker or wheelchair. The surface should also be firm, stable, slip-resistant, and sloped for drainage, but not more than a 12:1 slope ratio.

A safe sidewalk should contrast in color or tone from the surrounding area. The walkway can be a different material, texture, or color to distinguish it from the vehicular traffic area. It does not have to be concrete or asphalt. A universally accessible surface, as defined by the ADA, may be composed of such materials as compacted earth, stabilized decomposed granite, playground surfacing, asphalt, brick, or concrete. Walkway edge treatments using accent paving are a good option to provide aesthetic treatments rather than having the whole walkway width textured.

### Comfortable

To be comfortable, minimize long travel distances over aggregate concrete, pavers, or other materials that are rough or bumpy in areas where an alternative, smooth surfaced walkway is not an option.

### Destination

Decorative sidewalk surfaces increase the attractiveness of the facility and can add to a character or architectural theme that defines a destination facility.



*Verticals breaks should be a 1/4\"/>*



*Avoid uneven sidewalks.*



*Avoid rough paving textures.*



*Colorful paving at destination.*

# CLEARANCE

## Safe

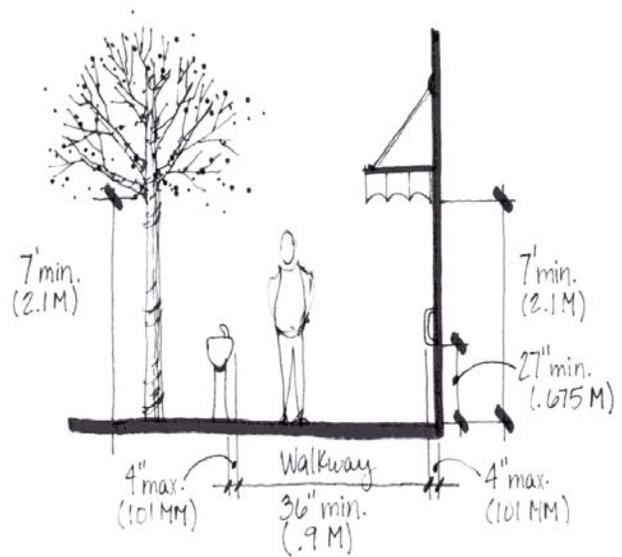
To be safe, a walkway must meet the recommendations defined in the Guide for the *Planning, Design, and Operation of Pedestrian Facilities* published by AASHTO. While site furnishings, street vendors, and outdoor dining areas are desired for the variety and interest they add to pedestrian areas, they should not be designed or located where they protrude into the primary pedestrian route. Protrusions are hazardous especially to those pedestrians with low vision. Specific guidelines include:

*A clear circulation path of at least 36 inches (.9m) should be maintained at all times, free of any obstacles or protruding objects. (Thirty-six inches should only be used for short distances. This document recommends a minimum of 6 feet wherever possible.)*

*Wall mounted objects shall not protrude more than 4 inches (100mm) from a wall when located between 27 inches (.675m) and 7 feet (2.1m) above the walkway.*

*Single post mounted objects shall not overhang more than 4 inches (100mm) per side of post when located between 27 inches (.675m) and 7 feet (2.1m) above the walkway.*

*The lowest edge of an object mounted on multiple posts having a clear distance between adjacent posts greater than 1 foot (.3m) shall be no higher than 27 inches (.675m) or no lower than 7 feet (2.1m).*



Walkway clearance minimums.



Horizontal clearance too narrow.



No circulation route around pole.

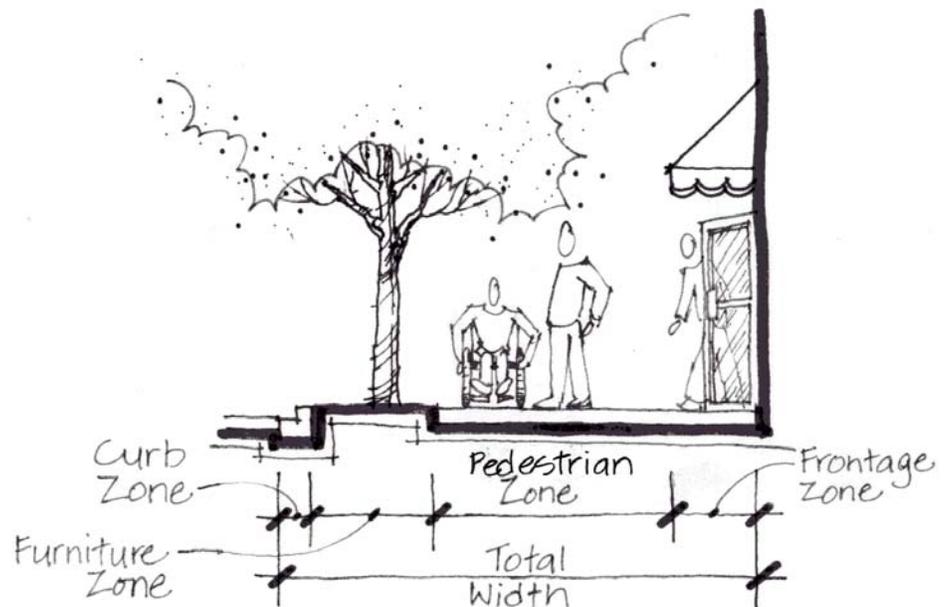


Amenities are clear of circulation path.

## CLEARANCE (con'td.)

Trees should be trimmed up so that the branches are at least 7 feet (2.1m) above the walkway.

The AASHTO guidelines, as well as others, define this clear circulation path as the *pedestrian zone* or *through-pedestrian zone* and recommend widths of 30 to 60 inches (see graphic). Between the pedestrian zone and the street is the *furniture zone* where trees, benches, mailboxes and other amenities are often located. The width of this zone ranges from 24 to 48 inches. Between the pedestrian zone and the building face is the *frontage zone* or *shy zone*, ranging from 12 to 60 inches wide. This is the area where doors open into and people stop to look in shop windows. In non-urban areas where the walkway is adjacent to open space, the frontage zone is not needed.



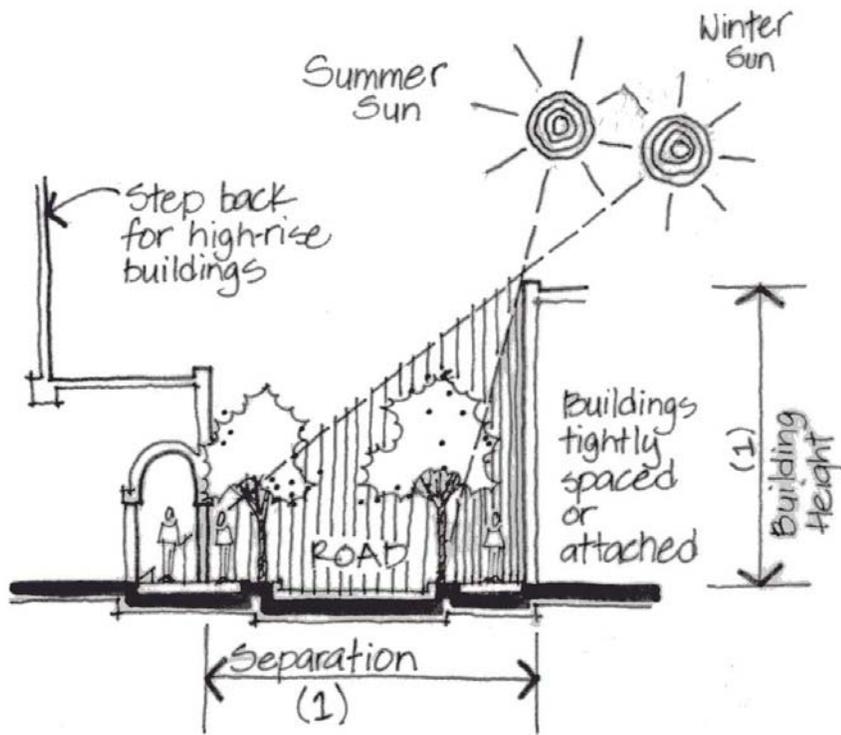
Walkway pedestrian zones.

## BUILDING FACADES

While a building-height to openings-between-buildings ratio is not a **safety** concern, this ratio is a factor in making a walkway **comfortable** and is critical in making a pedestrian area a **destination**, in areas adjacent to buildings.

To create a sense of human scale in the pedestrian spatial volume, the street and walkway width should be directly proportional to the height of the buildings. A building-height to openings-between-buildings ratio in pedestrian areas adjacent to building should be as near to 1:1 as feasible.

The scale decisions should be tempered by expected pedestrian volumes and the knowledge that street crossings should be narrowed for safety and comfort. In addition to providing human scale proportions, building spatial volume can provide shade to pedestrians. A stepped-back approach is also acceptable, but trees must be added to provide shade.



*Building separation ratio.*

## DRIVEWAY CROSSINGS

### Resources

**Designing Sidewalks and Trails for Access: Part II of II Best Practices Design Guide**

<http://www.fhwa.dot.gov/environment/sidewalk2/>

Pedestrians using wheelchairs or walkers and pedestrians with strollers need a relatively flat walking surface. The side flares and cross slopes of a driveway apron can cause tipping or a loss of balance. The preferred American with Disabilities Act Accessibility Guidelines (ADAAG) design for driveway crossing is to place the driveway crossing completely out of the path of the walkway. Acceptable alternatives incorporate the driveway into the walkway but provide a clear, flat space behind the driveway apron.

### Safe

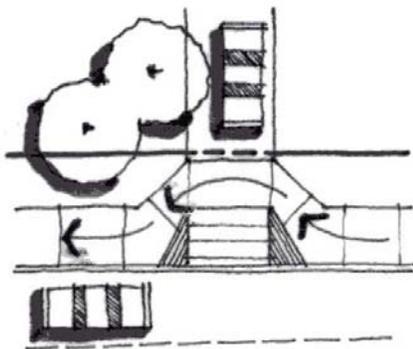
A safe sidewalk has a level alignment that goes around driveway crossings. For new builds, driveway crossings should be designed to the comfortable level.

### Comfortable

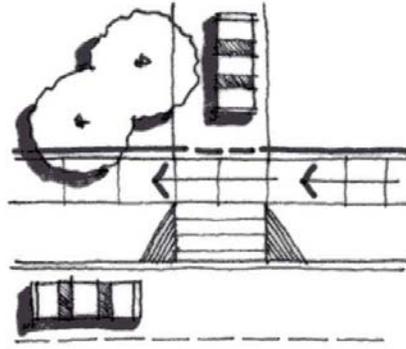
A comfortable sidewalk has limited driveway curb cuts or has shared curb cuts (one driveway per use per street), and the walkway alignment is straight behind the driveway crossings.

### Destination

A destination facility has a minimum number of or no driveway crossings because vehicular traffic is limited or not allowed.



*For a safe level: Walkways go around driveway crossings.*



*For new builds and a comfortable level: Walkways completely avoid driveway crossings.*



*Walkway is behind driveway crossing.*



*Too many driveway crossings and apron flares are hard to maneuver.*

## RAMPS

Ramps provide access between changes in elevation for people using mobility assistive devices, people pulling or pushing strollers, suitcases, or other items. Ramps should meet ADAAG recommendations for slope, gutters, landings, flares, and tactile warnings.

### Safe

A safe walkway has directional ramps at every intersection corner and wherever there is a change in elevation. These ramps must include the ADAAG recommendations for slope, gutters, landings, flares, and tactile warnings (truncated domes). The tactile warning area shall be a minimum of 24 inches deep and extend the width of the use area. The walkway color must contrast from the surrounding walkway (light to dark or dark to light). For new builds, the minimum should be the comfortable level.

### Comfortable

A comfortable intersection has directional ramps on each corner or a shared, broad ramp serving both crosswalks, rather than a ramp located diagonally in the center of the corner that does not provide directional alignment.

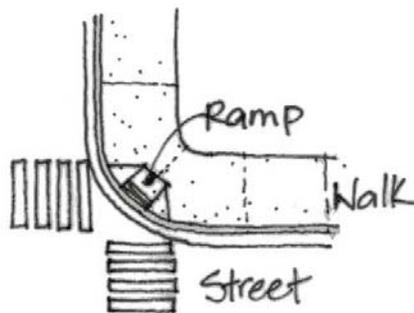
### Destination

A destination facility has either no vehicular intersection corners that would require a ramp or a very limited number because vehicular traffic is limited or not allowed.

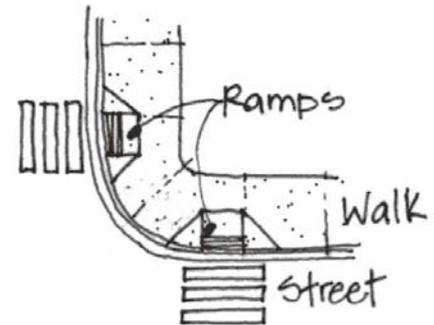
## Resources

**Designing Sidewalks and Trails for Access: Part II of II Best Practices Design Guide**

<http://www.fhwa.dot.gov/environment/sidewalk2/>



*For a safe level: A ramp with detectable warning and landing areas.*



*For new builds and comfortable level: Directional ramps with detectable warning.*



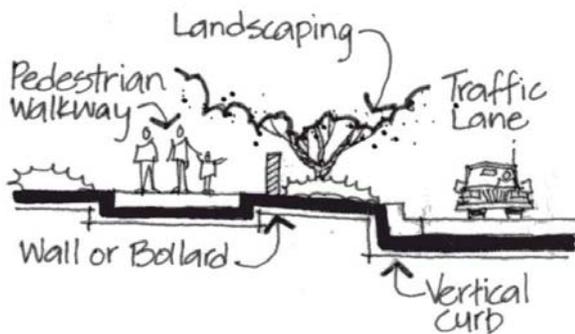
*Directional ramps.*



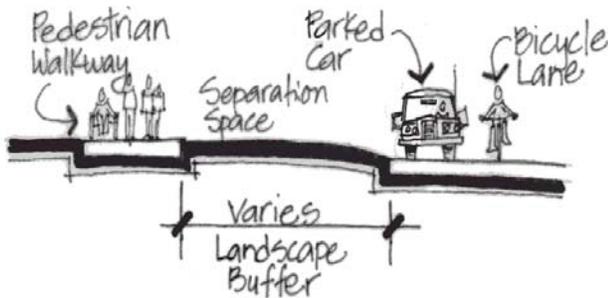
*Tactile warning contrasts from surrounding sidewalk.*

## PHYSICAL SEPARATION FROM TRAFFIC

A safe pedestrian area is vertically and/or horizontally separated from traffic. Vertical separation can be: curbs, bollards, parking (parallel or perpendicular), or buildings. Horizontal separation can be an on-street bike lane, a non-paved area (preferably landscaped), or landscaping in tree grates or planters.



Types of vertical separation.



Types of horizontal separation.

The separation can be a landscape buffer which also shades the pedestrian and provides human scale. A bike lane or parked cars also provides separation from traffic and provides additional storage areas for cars, or an alternative transportation route.

### Safe

To be safe, a pedestrian area must have at least **one** element of separation (vertical or horizontal) from traffic.

### Comfortable

To be comfortable, it must have at least **two** elements

### Destination

A destination facility must have **four** or more elements of separation.

Listed on the following pages are details for a variety of physical vertical and horizontal separators.

## PHYSICAL SEPARATION FROM TRAFFIC (con'td.)

### VERTICAL SEPARATIONS

#### Curbs

Vertical curbs shall be a 4-inch (0.1m) minimum height to be safe to inhibit cars from climbing curbs. Curbs do not have to be connected to the walkway except at transit stops. Rolled curbs are not recommended because cars can 'jump' the curb easier or park on the sidewalk.

#### Bollards

Bollards can be used as a vertical element to separate pedestrians from traffic.

Minimum height = 42 inches (1.1m)

Maximum spacing = 60 inches (1.5m)

#### Protective Barriers

In some situations, protective barriers may be desirable to separate pedestrians from traffic. These are most typically found on bridges or in tunnels.

#### Buildings

Buildings act as a vertical separation in situations where the pedestrian facility is completely, or almost completely, separated from roadways by buildings, such as plazas or pocket parks.



*Bollard separation.*



*Protective barrier used to separate walkway from high volume traffic.*

## PHYSICAL SEPARATION FROM TRAFFIC (con'td.)

### HORIZONTAL SEPARATIONS

In those instances where a horizontal separation is the only option between vehicles and pedestrians, separate pedestrians from traffic by at least 8 feet (2.4m). A 4-foot (1.2m) separation is acceptable in rural neighborhoods with low traffic volumes, approximately less than 1,000 cars per day. When a vertical curb is combined with the horizontal separation, the separation from traffic can be as little as 5 feet (1.5m).

#### Bicycle Lanes

Bicycle lanes provide a buffer between the walkway and moving vehicular traffic. The minimum width for a bicycle lane is 5 feet (1.5m). When used, bike lanes should use AASHTO standards for signing and pavement markings.

#### On-street Parking

Provide on-street parking as a buffer on streets other than arterials or Roads of Regional Significance. Parallel parking is preferred because it tends to slow down roadway traffic and drivers maneuvering in and out of parking stalls are more likely to see pedestrians and bicyclists than when diagonal parking is used. On-street parallel parking is generally a minimum of 8 feet (2.4m) wide.

#### Landscape Buffer

Planters can provide a buffer for pedestrians. The minimum width for a landscape buffer area is 5 feet (1.5m) in order to provide sufficient growing room for plant materials.



*Bicycle lane buffer.*



*On-street parking buffer.*



*Landscape buffer.*

## LIGHTING

Pedestrian level light can be provided by poles shorter than street lights (10 to 15 feet; 3m to 4.6m) or by bollard lights. Lights should be directed downward to prevent night sky pollution and concentrate light where it's needed. Pedestrian level lighting is most appropriate in areas where there is pedestrian activity in early morning, evening, and nighttime hours.

### Safe

Provide a minimum of 1 footcandle of light from grade to 5 feet (1.5m) above the walking surface, between sunset and sunrise, at vehicular intersections, changes in grade, crosswalks, and other similar points of potential conflict.

### Comfortable

Provide a minimum of 1 footcandle of light from grade to 5 feet (1.5m) above the walking surface, between sunset and sunrise, at vehicular intersections, changes in grade, crosswalks, and other similar points of potential conflict. Also provide points of illumination along the walkway so that users can move comfortably between light to light.

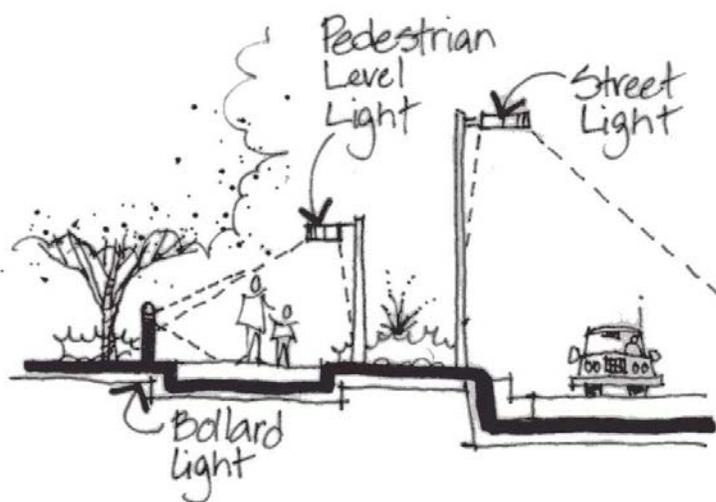
### Destination

A destination facility generally has continuous lighting coverage of 1 footcandle and the lighting fixtures contribute to the thematic character.

## Resources

### International Dark-Sky Association

<http://www.darksky.org/ordsregs/lchintro.html>



*Pedestrian lighting.*

## CROSSINGS and INTERSECTIONS

### Safe

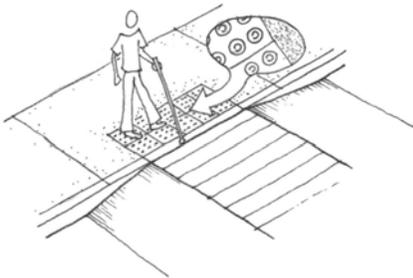
Crosswalks should be placed when warranted and at the safest place to cross a street.

### Comfortable

To be comfortable, the crossing may include an activated signal, be raised, have in-pavement flashing lights, have a sign stating “Watch for Turning Vehicles” or other such feature as those listed below. It should be noted that any traffic control devices must meet the warrant criteria of the MUTCD.

### Stop Signs

Use stop signs at intersections that are on pedestrian routes to slow vehicles where a traffic signal is not warranted (follow the appropriate traffic control standards for the jurisdiction where the facility is located and/or the MUTCD). Collector and arterial street crossings must have stop signs or other crossing aids for pedestrians.



*Speed tables also need tactile warnings.*

### Speed Tables

Speed tables elevate the entire crosswalk area to the level of the adjacent curbs which causes vehicular traffic to slow down. These also go by the names of: flat top speed humps, trapezoidal humps, speed platforms, raised crosswalks, or raised crossings. Tactile warning devices are of special importance here because there is no curb to define the edge of pavement for pedestrians with low vision.

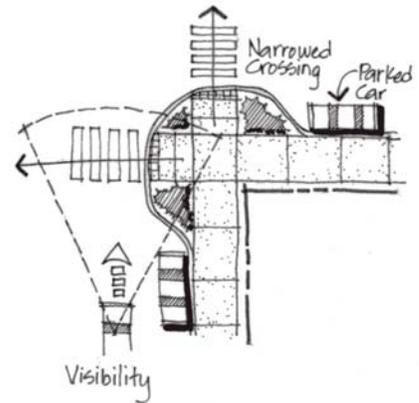


*Speed tables slow traffic.*

## CROSSINGS and INTERSECTIONS (con'td.)

### Curb Extensions

Create curb extensions (also called bulb outs) to reduce street crossing distances at intersections and mid-block crossings and improve sight lines for both pedestrians and drivers. Curb extensions are generally created where there is a parking lane but do not extend into or interfere with bicycle lanes.



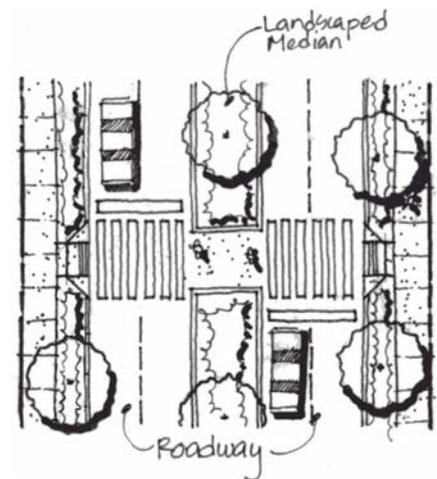
Curb extensions.

### Maximum Width

The preferred maximum crossing width for a pedestrian is two-lanes. Streets that are four lanes or more with a paved center left turn lane should be converted to two lanes in each direction with a raised median or refuge area (see next) at crosswalks to enhance pedestrian safety and comfort. This provides slower pedestrians with a place to wait should they need two signal crossing intervals to cross large streets.

### Raised Median or Refuge Area

Provide a raised median or refuge area if there are more than two lanes of traffic in each direction and/or traffic speeds are high. This enables pedestrians of limited mobility to reach the median during one signal crossing interval and finish crossing the street in the second signal interval. To aid pedestrians, the minimum median width should be 5 feet (1.5m) with accessible ramps (see ADAAG guidelines), or a street-level cut-through between raised medians.



Refuge area provided in median.



Raised median.

## CROSSINGS and INTERSECTIONS (con'td.)

### Resources

#### **Lesson 16 Mid-Block Crossings**

[http://safety.fhwa.dot.gov/ped\\_bike/univcourse/swless16.htm](http://safety.fhwa.dot.gov/ped_bike/univcourse/swless16.htm)

#### **Mid-block crossings or other areas of particular pedestrian safety concern**

Design mid-block crossings with distinct striping. To warn the motorist, use reflective 8-inch (203.2mm) letters on overhead advance warning signs or internally light the sign. These advance warning signs alert drivers that a mid-block crossing is ahead. Add mid-block pedestrian-activated signals where logical, given the destinations along the street.

On-street parking should be held back at least 20 feet (6.1 m) from crosswalks to provide improved sight lines for pedestrians and drivers.

#### **Pedestrian activated signals at canal crossings of arterial streets**

Canal crossings of arterial streets are of particular concern, as they are heavily used by pedestrians for recreation and commuting, yet none of them have pedestrian signals at crossings of arterial streets. Pedestrians frequently choose to jaywalk a cross an arterial street rather than detour to a nearby signalized intersection, even if it is only a short distance away.

The desired signal setup for a canal crossing is a hot (nearly immediate) response. When the pedestrian call actuator button is pushed, the clearance interval should be immediately activated. The minimal wait time should be a strong inducement for pedestrians to wait for the signal to cross. Sight-distance should be adequate to ensure that motorists will see the light in time to stop. Warning signs should be installed on the approaching roadway.

If a pedestrian activated system is used, it is important to place a pedestrian push button in the median. There will be times when some pedestrians start too late, or when slower pedestrians need additional time to cross. In these rare instances, the pedestrian needs to reactivate the signal from the median. There is also an equestrian push button model available, mounted higher than a pedestrian push button, for those areas with a high volume of equestrian traffic.

## TRAFFIC CALMING

There are numerous traffic calming features being designed, used, and studied throughout the country and internationally. The addition of any one or more of these features to a pedestrian facility will make the facility more **comfortable**. Combine several treatments such as speed tables at crosswalks and channelization to slow traffic.

### Corner Radii

Reduce the typical corner radii to slow down turning vehicles. Suggestions include a radius as small as 10 to 15 feet (3 to 4.5m) where residential streets intersect to 25 to 30 feet (7.5 to 9m) where arterial streets intersect.

### Traffic Circles

Place traffic circles at intersections on local and collector streets to slow cut through traffic. If used, traffic circles should be designed keeping in mind persons with visual impairments. It is harder for these pedestrians to know when it's safe to cross the street because they cannot determine from which direction sound is coming.

### Channelization

Narrow the street at the intersection or mid-block location, in order to reduce the width of the roadway to encourage drivers to slow down.

## Resources

### ***The Effects of Traffic Calming Measures on Pedestrian and Motorist Behavior***

[http://www.walkinginfo.org/task\\_orders/to\\_11/Calmtrmt.pdf](http://www.walkinginfo.org/task_orders/to_11/Calmtrmt.pdf)

### ***National Center Bicycling & Walking: Traffic Calming***

[http://www.bikewalk.org/walking/design\\_guide/pedestrian\\_tech/ped\\_traffic\\_calming/index.htm](http://www.bikewalk.org/walking/design_guide/pedestrian_tech/ped_traffic_calming/index.htm)

### ***Institute of Transportation Engineers: Traffic Calming Library***

<http://www.ite.org/traffic/>



*Traffic circles slow vehicular speeds.*



*Channelization slows vehicular speed.*

## TRAFFIC CALMING (con'td.)

### Resources

#### Woonerf

[http://www.walkinginfo.org/de/curb1.cfm?codename=32d&CM\\_maingroup=Traffic%20Calming](http://www.walkinginfo.org/de/curb1.cfm?codename=32d&CM_maingroup=Traffic%20Calming)

#### One more 'woonerf,' albeit flawed, a little less whoosh

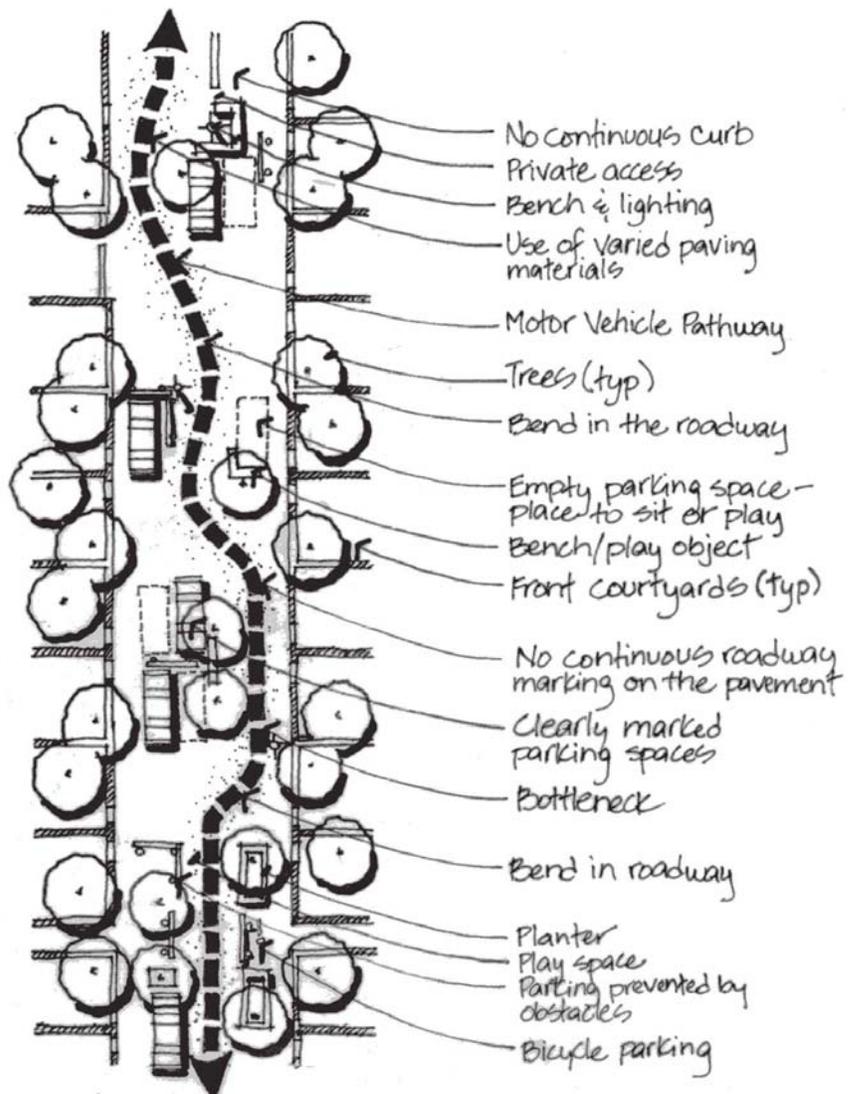
<http://www.urbanplanet.org/forums/lofiversion/index.php/t2002.html>

#### Streets for People Too

[http://www.architectureweek.com/2004/0505/building\\_1-2.html](http://www.architectureweek.com/2004/0505/building_1-2.html)

#### Woonerf

Convert the entire "street" to a living yard, or an area where no segregation is made between motorized and non-motorized traffic, so that pedestrians have full use of the entire area. Commonly woonerfs are narrow streets without curbs and sidewalks, and vehicle speed is reduced by placing trees, planters, parking and similar improvements within the roadway.



Elements of Woonerf.

# SIGNALS

## Safe

To be safe, timing should be based closer to the speed of slower users, not on the average speed of all users. Use a walking speed of 3.0 (0.91m) feet per second or slower to calculate clearance time, based on the walking speed of the elderly, children, and other slower users.

## Comfortable

To be comfortable, crossings should have a Walk/Don't Walk sign, preferably ones that use international symbols rather than words. Countdown or signals with seconds remaining for safe crossings would add to pedestrian comfort level.

## Visual/Auditory Considerations

Use international sign markings at destination facilities.

Where there is a push button, consider using a tactile arrow pointing in the direction of pedestrian travel controlled by the button and the universal tactile and visual symbol of three dots in a triangle on the button, as close to the center as practicable. Audible signals to also help orient the visually impaired.

## Resources

### ***The Effects of Pedestrian Countdown Signals in Lake Buena Vista***

[http://www.dot.state.fl.us/Safety/ped\\_bike/handbooks\\_and\\_research/research/CNT-REPT.pdf](http://www.dot.state.fl.us/Safety/ped_bike/handbooks_and_research/research/CNT-REPT.pdf)

### ***Year 2 Field Evaluation of Experimental "In-Street" Yield to Pedestrian Signs 1999***

<http://www.walkinginfo.org/pdf/r&D/ytpsign.pdf>

### ***The Effects of NO TURN ON RED/YIELD TO PEDS Variable Message Signs on Motorist and Pedestrian Behavior***

[http://www.dot.state.fl.us/Safety/ped\\_bike/handbooks\\_and\\_research/research/](http://www.dot.state.fl.us/Safety/ped_bike/handbooks_and_research/research/)

### ***Use of Animated LED 'Eyes' Pedestrian Signals to Improve Pedestrian Safety***

[http://www.dot.state.fl.us/Safety/ped\\_bike/handbooks\\_and\\_research/research/led\\_eyes.pdf](http://www.dot.state.fl.us/Safety/ped_bike/handbooks_and_research/research/led_eyes.pdf)

### ***Evaluation of Automated Pedestrian Detection at Signalized Intersections***

<http://www.tfhre.gov/safety/pedbike/pubs/00-097.pdf>

### ***Accessible Pedestrian Signals***

<http://www.walkinginfo.org/aps/home.cfm>

## SHADE

In an sunny climate like Arizona, pedestrians seek protection from the sun from late spring through fall. For the other months of the year, people gravitate to filtered or direct sunlight to find a comfort zone in cooler temperatures. The most intense sunlight and temperature extreme in the Desert Southwest occur from May to September, from 12:00 noon to sunset. Shade cover can be provided by either an architectural feature or the canopy of a tree. Trees are recommended as the minimum acceptable protection in this climate.

### Safe

Establish 50 percent shade along pedestrian routes and at gathering places for this intense period (or one 25-foot width canopy tree per 53 feet of sidewalk). Provide some shade year-round on the walkway. In areas that demographically have more elderly pedestrians, provide a minimum 75 percent continuous coverage in the intense summer period.

### Comfortable

Provide 60 percent shade coverage along the walkway (or one 25-foot width canopy tree per 38 feet of walkway).

### Destination

Provide 75 percent shade coverage or greater along the walkway (or one 25-foot width canopy tree per 30 feet of sidewalk).

Shade can be achieved in several ways. Street trees are the most common method of providing shade along walkways. The type of shade provided - whether continuous or concentrated - depends on the orientation of a walkway (see graphic next page) and on how trees are distributed along it. Continuous shade is best achieved



*No shade creates a very harsh environment.*



*Example of 75% shade.*

## SHADE (con'td.)

when trees are equally spaced. Concentrated shade is most appropriate at gathering places or nodes such as transit stops.

Awnings and canopies are another excellent source of shade. Use the clearance minimums (see section on Clearance) when installing them.

When selecting plant materials for shade, plants native to this region of Arizona or similar low-water use, desert plants should be used. See list at left for examples of native or low-water use trees.

### Native or Low-water Use Trees

**Mesquite** (*Prosopis* sp.)

**Palo Verde** (*Cercidium* sp.)

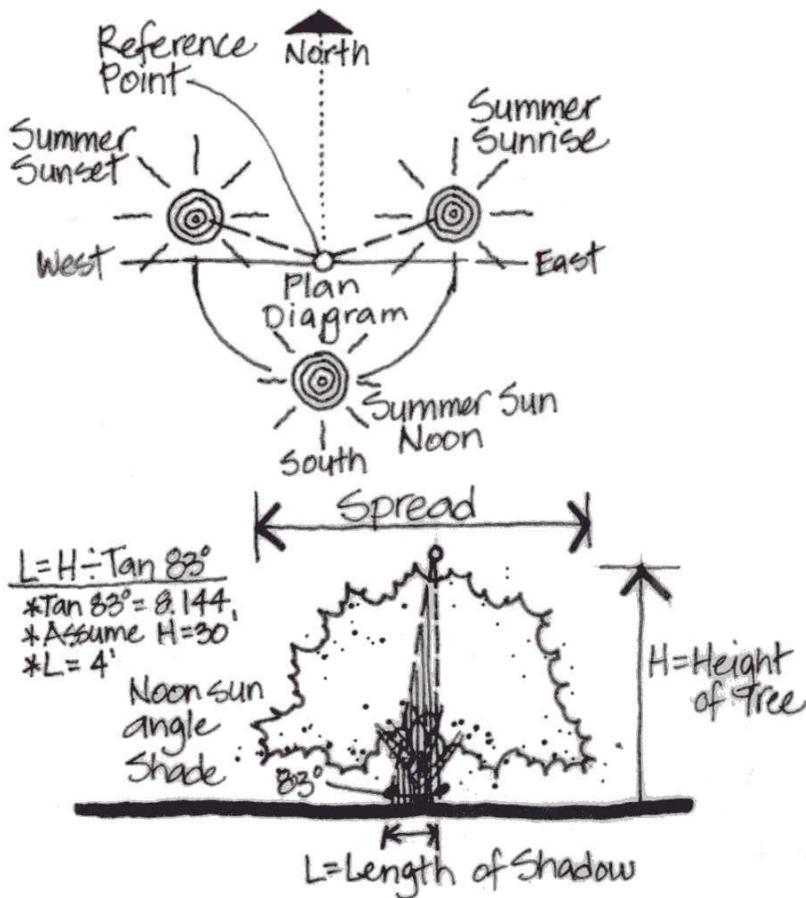
**Acacia** (*Acacia* sp.)

**Ironwood** (*Olneya* sp.)

**Desert Willow** (*Chilopsis* sp.)

**Ebony** (*Pithecellobium* sp.)

**Lysiloma** (*Lysiloma* sp.)



Summer shade at summer solstice - June 21.

## SEATING

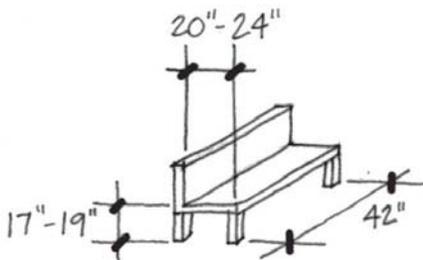
Seating is a primary factor in promoting walking and creating even a minimally comfortable environment. All benches or other seating surfaces should meet the ADAAG guidelines for accessibility, including: a seat surface between 17 and 19 inches (430 and 485mm) above walkway surface, a length of at least 42 inches (1064mm), 20 to 24 inches (510 to 610mm) deep, and have a back support. Seating and other furnishings should not protrude into the pedestrian route of travel (see section on Clearance). Benches should be placed to allow a person in a wheelchair to have immediate adjacent access (3 foot radius minimum). Seating opportunities can be either fixed or moveable and the seating surface should not be so rough that it is uncomfortable to sit or can damage skin or clothing.

### Comfortable

Seating opportunities should be provided at least every 500 feet (152m) along primary pedestrian routes.

### Destination

To be a destination facility, provide multiple seating opportunities, with shade, at the rate of two to three per block.



Minimum seating dimensions.



Public art doubles as seating.



Seating can be a bench.



Seating can be combined with a wall.

## AMENITIES

Amenities encourage walking and are appropriate in all pedestrian settings. Where providing amenities increases pedestrian activity, it may be perceived that these facilities are safer, because there are 'more eyes' monitoring activity. Amenities include trash receptacles, phones, drinking fountains, kiosks, and restrooms. The number and type of amenity will probably be highest at destination facilities. All amenities should be accessible per ADAAG guidelines.

### Trash Receptacles

Provide trash receptacles and regular pickup at pedestrian gathering places and nodes such as bus stops and mailboxes.

Provide trash receptacles and regular pickup along major pedestrian routes at nodes and/or 500-foot (152.4m) intervals.

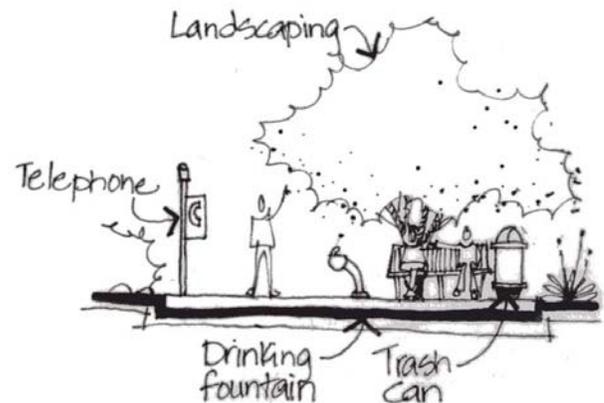
Provide trash receptacles and regular pickup at all **destination** facilities.

### Telephones

Provide emergency telephones at 1,000-foot (304.8m) intervals or at nodes, gathering places, and **destination** facilities.

### Drinking Fountains

Provide accessible drinking fountains at nodes, gathering spots, and **destination** facilities. Refer to ADAAG guidelines for accessibility requirements.



*Typical amenities.*



*A corner kiosk provides information and directions.*



*Convenient trash receptacle.*



*Pedestrians appreciate telephones at transit station.*

## AMENITIES (con'td.)

### Restrooms

Many public restrooms already exist around the Valley at parks, libraries, city halls, and city community centers. Providing wayfinding signs to these facilities would increase the public perception that there are restrooms available.

All **destination** facilities should have restrooms, including directional signs that tells visitors where they are located. Restrooms, where provided, should meet the ADAAG guidelines.



*Shaded gazebos provide respite.*



*Playful interactive water.*



*Convenient public restrooms.*

## SIGNS

Signs can serve many purposes including wayfinding, informational (for motorists and pedestrians), and directional. Signs can be an important element of creating a theme or character at a destination facility. Signs should have a consistent level of contrast (black on white) to assist persons with low vision. Signs with pictures, universal symbols, and universal colors are also highly communicative.

### Wayfinding Signs

Wayfinding signs are not required for a pedestrian area to be safe. However, it encourages walking so they are appropriate in all settings. Wayfinding signs are highly encouraged for destination facilities.

Wayfinding signs are pedestrian-oriented and are generally designed to be a complete system of graphically designed signs. They are at eye-level to a pedestrian, are fairly detailed in design, and provide information at walkway intersections.

### Business Signs

Encourage pedestrian scale signs for businesses. Pedestrian signs are adjacent to the pedestrian walkway (but not protruding into the walkway), are oriented to the pedestrian rather than the vehicle, and provide slow-speed detail in design.

### Directional Signs

Consider a pedestrian scale directory sign system to orient visitors. Locate directories at entrances to the pedestrian area, or at major pedestrian intersections. Directional signs are often one element of an overall wayfinding sign system.



*Wayfinding signs direct pedestrians and establish a theme.*



*Pedestrian level business signs.*

## PUBLIC ART

### Resources

#### ***How Art Economically Benefits Cities***

[http://www.pps.org/info/pub\\_art/art\\_impact](http://www.pps.org/info/pub_art/art_impact)

Public art can and should be included in all pedestrian facilities. Every functional pedestrian feature (sidewalks, bus shelters, benches, etc.) can be designed to incorporate artistic aesthetics. An area theme or character can be expressed through art. Public art certainly makes pedestrian places more comfortable and encourages walking.



*Traditional art.*



*Walls and site furnishings are art.*



*Transit shelters can be 'art'.*

## LANDSCAPE

Trees may be used to provide the minimum level of shade (see section on Shade) and can also serve as a vertical physical separator from traffic (see section on Physical Separation From Traffic). However, plants are also important for softening an urban environment and creating a human scale. Landscape provides visual interest and an opportunity to strengthen or express a local or regional character. Many drought tolerant plants provide seasonal variety, color, texture, and interest, thereby adding to the quality of the pedestrian environment.

When selecting plant materials, plants native to this region of Arizona or similar low-water use, desert plants should be used. There are numerous local sources of information for native plants (see box at left).

The understory to trees, the shrubs and groundcovers, should be free of thorny or spiky plants within 2 feet (0.6m) of the edge of the walkway.

Plantings should not block the walkway or create visibility and/or security issues.

In urban areas, pocket parks and landscaped patios and courtyards adjacent to the pedestrian area are encouraged. Low walls allow for visual access to the pedestrian route without allowing physical access.

## Resources

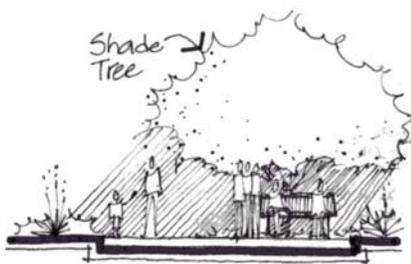
**Low Water-Use Plants for California and the Southwest** by Carol Shuler

**Plants for Dry Climates** by Mary Rose Duffield and Warren Jones

**Native Plants for Southwestern Landscapes** by Judy Mielke

**Landscape Plants for Dry Regions** by Warren Jones and Charles Sacamano

The **University of Arizona Cooperative Extension Service** at 4341 East Broadway Road, Phoenix, AZ, 85040



Locate landscape to shade seating and walkways.



Low water use trees in an urban setting.



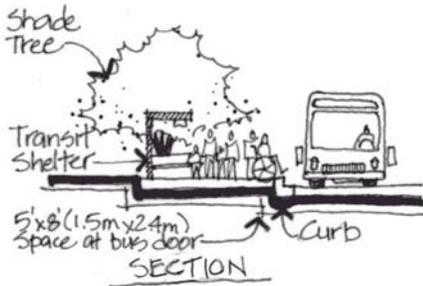
Low water use plantings make a pleasant streetscape.

## TRANSIT STATIONS

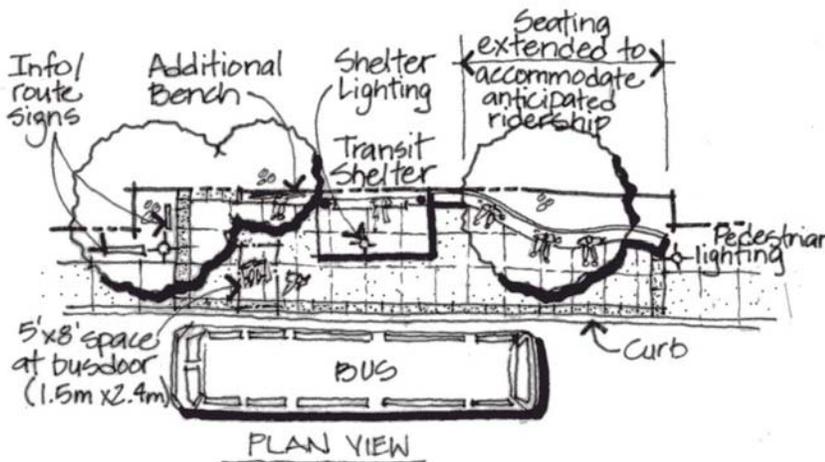
Transit represents a pedestrian’s link to a wider area than that which they would walk. Connections to transit stations should be efficient, logical, and recognizable. Comfort while waiting is also important. Sufficient seating should be determined either by field observations of the individual transit stations, or by using Regional Public Transit Authority ridership data. A mixture of heavy shade, light shade, and no shade should be provided to accommodate all aspects of the climate. Shade should be accessible to all pedestrians.

Provide amenities including trash receptacles, bicycle parking, and wayfinding, and directional signs. Transit stations should include telephones, drinking fountains, and restrooms (all accessible per ADAAG guidelines). Route maps and lists should be provided via large posted maps or brochures. These amenities should be placed so as not to block pedestrian travel on the adjacent sidewalk. Likewise, enough open space should be maintained to safely operate wheelchair lifts.

Provide pedestrian crossings in close proximity to transit stations to discourage jaywalking; people will not take long detours, regardless of how dangerous jaywalking may be. Bus stops should be placed on the far side of intersections and crosswalks to encourage pedestrians to cross behind the bus.



Transit station dimensions.



Transit stations amenities.



Transit stations have route maps and are clearly signed.



Transit stations should have numerous pedestrian amenities.

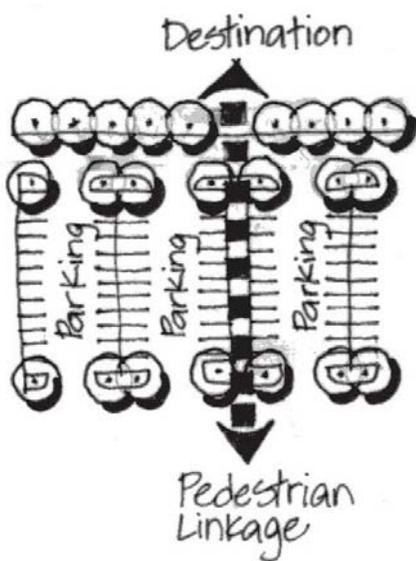
## PARKING LOTS

Locate large parking lots to the rear or side of buildings with direct connections to the pedestrian route and provisions for shade or trees.

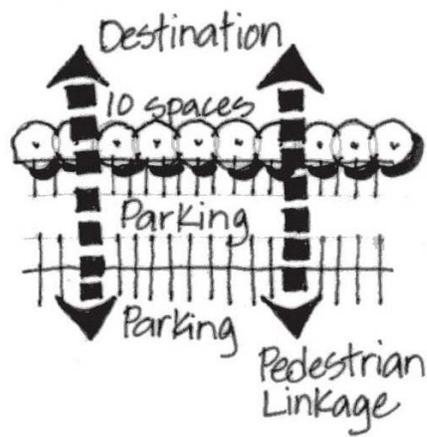
If parking rows are perpendicular to the destination, provide one walkway for each two to four parking rows, separate from the parking drive, to allow for pedestrian access to adjacent areas.

If parking rows are parallel to the destination, provide a walkway at the distance of every ten parking spaces.

Provide off-street parking in landscaped lots with direct pedestrian access to building entries. Access from the parking area to the building entrance should not exceed ¼ mile (0.4km).



Walkways through parking parallel to destination.



Walkways through parking perpendicular to destination.

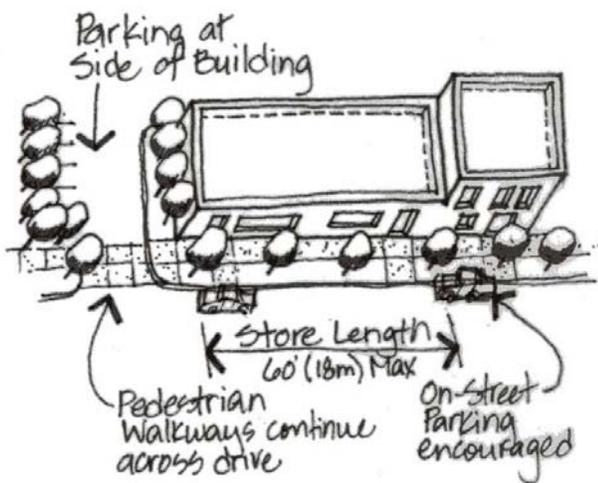
## VARIETY

Variety elements are all the additional features that have been used to create special places or **destinations** or to make facilities more comfortable.

Consider passive or evaporative cooling systems at major gathering places.

Upgrade the walkway surface to reflect the character of the area with decorative paving. Decorative paving could be one element of a cohesive architectural theme. However, keep in mind that the surface should not be uncomfortably rough or bumpy (see Surface/Texture).

Establish a strong sense of entry and architectural cohesion to foster a sense of arrival and special attention to place for the visitor.



On longer storefronts, provide windows every 10 feet (3.2m) to help create a human scale.

Limit the length of individual storefronts to no greater than 60 feet (18.3m) to create human scale.

Provide signs with a cohesive architectural/cultural theme.

Support off-site parking by shuttle service.

Prohibit reflective glass next to public walkways to cut down on glare and heat.

For destination facilities, provide a unique theme or motif that unifies it and that is expressed in all enhancements.

*Store front length limited; parking on the side.*



*Use of brick sets a theme.*



*A sense of arrival created at a destination.*





encourage bicycling and walking as a safe and preferred method of travel to school. We also suggest that this program be used to increase the safety of children as they move through school parking lots, drop-off zones and nearby streets.

Teaching others is fundamental to increasing the constituency of pedestrian advocates. Sponsoring a training course and setting up a speakers bureau “how-to” sheets are included to help other individuals and entities educate others about the benefits of walking.

## HOW-TO SHEETS

The “how-to” sheets are designed to provide “off-the-shelf” directions for entities and individuals wishing to implement some of the ideas included in these guidelines.

The pedestrian review “how-to” sheet is especially useful in assessing the extent to which an area is safe, comfortable or a destination.

The Pedestrian Zoning Review Checklist can provide guidance to municipalities, neighborhoods and individuals that want to examine the extent to which a site plan or request for rezoning considers pedestrian travel and the needs of pedestrians.

The Safe Route To School “how-to” sheets are designed for parent-teacher organizations, schools, school districts and others that are concerned with children’s health and safety and want to



## HOW TO CONDUCT A PEDESTRIAN REVIEW

### What Is A Pedestrian Review?

A pedestrian review (or walkability study) is an examination of the environment, facilities, and conditions of a specific area. The goal of the pedestrian review is to assess the quality of the walkable environment. Facilities, safety, security, aesthetics, pleasure, motorist behavior, and access to transit all contribute to walk-ability. Furthermore, a good pedestrian environment should be useable and safe for all including the young, the elderly and those with disabilities. Also refer to the *Kalamazoo Non Motorized Transportation Plan*<sup>1</sup>.

### Why Conduct a Review?

- *To raise awareness about facilities, considerations for improving facilities, the walking environment, and the overall safety of an area.*
- *To educate people about who is walking in an area and their specific needs.*

- *To focus attention on a specific opportunity or problem.*
- *To assess the pedestrian environment prior to a planning or design effort.*

### When Should a Review Be Conducted?

Pedestrian reviews can be conducted any time. They are helpful to assess what needs to be done to improve an area, how well existing facilities are performing, and to make mid-course corrections to existing plans and designs.

### Who Should Conduct the Review?

Anyone can conduct a review, and the more people that are involved, the better. Including area residents, business people, children, people with disabilities, older people, people who may not speak or read English, design professionals, engineers and staff and elected and appointed members from the community will enhance the amount and quality of information gathered on the review. Upon deciding where to conduct the review, invite people who work in local businesses, residents, representatives from the neighborhood organizations as well as elected officials and local government staff. It might be beneficial to involve professional organizations that have expertise in transportation design or pedestrian design and safety.

### Where Should a Review Be Conducted?

A pedestrian review must always be conducted at the site. It can be conducted at an intersection or a stretch of sidewalk as well as a downtown, a shopping center or shopping mall, a parking lot, a school a park, stadium, bus stop or any other place where people walk.

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<sup>1</sup> <http://www.dot.state.ia.us/trails/ped-bikeHandbook/Appendix4.html>.

## How Is a Review Conducted?

Use the sample review form on the following page. This form is adapted from the Kalamazoo *Non-Motorized Transportation Plan* and can be customized for any particular area or site.

### Resources

*Federal Highways Administration*

<http://www.walkinginfo.org/pdf/r&d/ucourse.pdf>

*Paper on Pedestrian Audits*

<http://www-civil.eng.monash.edu.au/people/centres/its/WorkshopsSeminars/PastActivities/caitr/Lillis.doc>

*Sample Audit Forms*

<http://www.dot.state.ia.us/trails/ped-bikeHandbook/Appendix4.html>

*Conducting a Walkability Audit with ARCPad GIS*

<http://www.uoregon.edu/~schlossb/arcpad/walkability/walkability.htm>

*The Walkable Community Workshop Report (for an example of a report based on a series of audits)*

[http://www.bikewalk.org/assets/Reports/WCW\\_NM.pdf](http://www.bikewalk.org/assets/Reports/WCW_NM.pdf)

# PEDESTRIAN REVIEW

The purpose of a pedestrian review is to assess the quality of the walking environment in a chosen study area. Facilities, safety, security, aesthetics, pleasure, motorist behavior, and access to transit all contribute to making an area safer and more comfortable for pedestrians (refer to the Specific Design Guidelines in this document).

## Getting Started

- Select a study area or site for evaluation.

Make a rough map of the study area. Maps are accessible through a variety of internet sites such as [mapquest.com](http://mapquest.com) or [multimap.com](http://multimap.com). Show destinations (like shopping centers, stores, schools, parks, libraries or other places that attract people) on the map.

- Select a time, date and starting location for the review. End the review at the same location.
- Provide a copy of this checklist and the map to everyone participating in the review.

## Conducting the Review

- Ask everyone to examine the checklist and the map to become familiar with the area to be reviewed.
- As each person walks, encourage the use of boxes on the review form as potential situations and issues are encountered. Encourage participants to write notes on the review forms and indicate items that are successful as well as areas that need improvement.
- Note locations of specific concerns or successful items on the map.
- Bring a camera. Take pictures of key areas or items that need to be remembered.
- At the conclusion of the audit, discuss the audits and findings. Take notes at the discussion and collect the completed forms from participants.
- Formalize the findings into a report.

## PEDESTRIAN REVIEW CHECKLIST

	<b>RATING</b> 1-5 where 1 is strongly disagree and 5 is strongly agree	<b>COMMENTS</b>
<b>Is There a Place to Walk?</b>		
Sidewalks are provided.		
Sidewalks are continuous.		
Sidewalks are clear.		
Sidewalks are in good repair.		
<b>Is it Possible to Cross the Street Safely?</b>		
Crosswalks provided where needed.		
Pedestrian signals are on traffic light poles.		
Mid-block crossings are provided where needed.		
Timing of the traffic lights are adequate to allow people to cross comfortably.		
The intersection width is such that it is comfortable to cross.		
<b>Universal Access - Are the Needs of all Pedestrians Accommodated?</b>		
Curb cuts/ramps are available.		
Ramps lead into crosswalks and not into traffic lanes.		
The width of the sidewalk is adequate for two people to walk abreast.		
The condition of the sidewalk is adequate.		
The boundary of the sidewalk is discernible to pedestrians with low vision.		
Crossing signal actuators are working and accessible.		

## Pedestrian Policies and Design Guidelines

	<b>RATING</b> 1-5 where 1 is strongly disagree and 5 is strongly agree	<b>COMMENTS</b>
There is enough time to cross the street.		
<b>Is it Pleasant and Convenient to Walk?</b>		
There is enough shade.		
Vegetation provides a shady and comfortable environment.		
The route is free of litter, trash, and debris.		
The route is well lit.		
There is not too much traffic.		
The traffic is not too fast.		
The traffic is not too close to the walkway.		
There is pedestrian access to key destinations.		
The walkways directly access building entrances.		
<b>Do Drivers Behave Well?</b>		
Drivers yield to pedestrians.		
Drivers do not block the crosswalk when they are turning.		
Drivers do not back up without looking.		
Drivers do not block the sidewalk when they are pulling out of parking areas onto the street.		
<b>Is Transit Access Convenient?</b>		
The transit stop is served by a sidewalk.		
The transit stop is close to the main destination.		

	<b>RATING</b> 1-5 where 1 is strongly disagree and 5 is strongly agree	<b>COMMENTS</b>
There is a transit shelter.		
It is easy to get to the transit stop.		
The transit stop has seating.		
The transit stop feels safe.		
It's easy to transfer from this transit stop.		
The park and ride feels safe.		
<b>Are There Amenities for Pedestrians?</b>		
There are places to sit along the way.		
Drinking fountains are provided.		
There are trash receptacles.		
There are signs that clearly mark the route.		
There are nearby restrooms.		
Route information is posted.		
There is night lighting.		

## PEDESTRIAN ZONING REVIEW CHECKLIST

This check list will help in the review of a rezoning request or a site plan to determine if a pedestrian area is safe, comfortable, and/or a destination.

- Is the pedestrian facility clearly marked for pedestrians or is it marked as a multi-use facility?
- If the facility is marked as a pedestrian only facility, are bicycle and other non-motorized facilities clearly marked and equally provided?
- Are on-street bicycle lanes provided and clearly marked?
- Are trash receptacles conveniently provided?
- Are pet waste amenities (such as pet waste receptacles and bag holders) provided?
- Are bicycle parking areas close to buildings identified?
- Is access from surrounding streets and neighborhoods identified?
- Is this access secure (e.g., patrolled, lit, visible)?
- Is adequate separation from vehicle traffic flow provided?
- Are there public drinking fountains?
- Open space and landscaping softens built environment and creates interest?
- Are there shade trees?
- Is there protection from elements with structures (sun, rain, hail, etc.)?
- Does the pedestrian environment provide a sense of overall safety?
- Is there lighting along off-street pedestrian routes that creates a sense of security and safety?
- Do buildings provide “eyes on the street” with porches, balconies, windows, and doors?
- Are there public and/or emergency telephones that are operable by children?
- Does street-level lighting create a sense of safety along parallel sidewalks?
- Are parking lots well lit?
- Are there opportunities for unregulated pedestrian crossings?
- Do vehicular speeds create a danger to pedestrians?
- Does traffic flow create a danger to pedestrians?
- Are there regulated pedestrian crossing areas through school parking lots, driveways, drop-off areas and delivery areas?

- Are there comfortable buildings/street setbacks?
- Are arcades and/or shade structures that lead to main entrances integrated into buildings?
- Are building entrances inset to provide refuge from vehicular traffic?
- Are building entrances accessible and visible from the surrounding sidewalks?
- Are building entrances accessible and visible from parking areas?
- Does the architectural character define a sense of neighborhood/community?
- Are building signs easily read (letter size, color contrast, etc.)?
- Do visual terminations break walking trips into defined segments?
- Are there clearly marked pedestrian ways from the surrounding sidewalks to the buildings' main entrance?
- Do parking lot signs clearly direct pedestrians and vehicles?
- Are there well-marked crosswalks at intersections (painted, alternative material, etc.)?
- Are there well-marked crosswalks at other locations (mid-block, on-site)?
- Are there pedestrian activated "walk" buttons at crosswalks?
- Do "count-down" crosswalk signs show time remaining to cross?
- Do traffic speeds create a sense of pedestrian vulnerability?
- Do curb cuts at intersection direct people into crosswalks and not diagonally into the traffic lanes?
- Do crosswalks have audible signals?
- Do medians provide designated "refuge" locations for street crossings of wide streets?
- Does neighborhood specific signage visible from the street and sidewalk help create neighborhood identity?
- Is there area lighting along pedestrian routes from the school property perimeter to the entrances of school buildings?

### School Zones

- Are students visible to motorists from a reasonable stopping distance?
- Are students visible to crossing guards from a reasonable distance?

## Pedestrian Policies and Design Guidelines

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- Is the school bus drop-off/pick-up zone separate from the pedestrian traffic moving from the school's main activity areas to surrounding sidewalks in order to reduce pedestrian congestion and/or confusion?
- Are there well-marked bus stop areas?
- Bus drop-off/pick-up driveways do not cross pedestrian routes into the building's main activity area in order to reduce conflict points?
- Parent drop-off/pickup driveways do not cross pedestrian routes into the building's main activity area in order to reduce conflict points?
- Student/staff/faculty parking driveways do not cross pedestrian routes into the building's main activity area in order to reduce conflict points?
- Are there crosswalks approaching school readily visible to traffic (no blind curves, etc.)?
- Is there adequate time for children to cross the street on the "walk" button?
- Have traffic calming techniques been used in areas surrounding school?
- Are high visibility signs installed along roads indicating presence of school and children?



## THE SAFE ROUTE TO SCHOOL PROGRAM

### What Is a Safe Route To School Program?

Safe Routes to School programs are sustained efforts to assess and take measures to make walking and biking conditions on the route to school safe, comfortable, thus encouraging children to walk and bike these routes.

### Why Is a Safe Route To School Program Beneficial?

There are plenty of great reasons to walk to school – less traffic, safer streets, cleaner air – but one of the best is that children and parents will be healthier. Obesity rates among children have more than doubled in the past twenty years, according to the National Longitudinal Study of Youth. Even worse, rates of obesity are much higher among minority children than among white youth, suggesting a grave social inequity in the availability of safe, healthy recreational opportunities.

### Who Should I Contact to Organize a Safe Route To School Program?

Walktoschool.org is one of the premier websites dedicated to the Safe Route To School concept and can be accessed at <http://www.walktoschool-usa.org/index.cfm>. Other organizations such as the National Center for Bicycling and Walking have extensive information on the Safe Routes to School Concept. Their website is located at: [http://www.bikewalk.org/safe\\_routes\\_to\\_school/SR2S\\_getting\\_started.htm](http://www.bikewalk.org/safe_routes_to_school/SR2S_getting_started.htm).

### Where Are Safe Route To School Programs Offered?

The Safe Route to School concept is international. Programs are offered in Europe, England, Australia and other locations globally. In the United States, programs are pervasive throughout all States. Transact, a transportation advocacy group has published a summary of Walk to School Programs Nationwide. It can be accessed at <http://www.transact.org/report.asp?id=49>.

### How Do I Conduct the Review?

Use the sample review form on page 93. This one is adapted from the Kalamazoo Non-Motorized Transportation Plan. This form can be customized for a particular site or area.

## Resources

*National Highway Traffic Safety Administration  
Safe Routes To School Handbook*

<http://www.walktoschool-usa.org/downloads/SR2S-NHTSAtoolkit.pdf>





## ORGANIZING AND CONDUCTING A SAFE ROUTE TO SCHOOL PROGRAM

Safe Routes to School programs are sustained efforts to assess and take measures to make walking and biking conditions on the route to school safe and comfortable and enabling and encouraging children to walk and bike these routes.

### Getting started

- Identify the school.
- Contact the Principal of the school, the Parent Organization, the transportation manager, and staff from the local jurisdiction. Let them know a Safe Route to School program is being organized and encourage them to get involved.
- Identify within the school a Safe Route to School team. Ask the school or Parent Organization to sponsor the team and its work.
- Make a rough map of the area not served by school busses. Access maps through a variety of Internet sites such as mapquest.com, multimap.com, or from the local jurisdiction.

On the map, show the location of the school and crossing guards.

- Advertise the program and enlist support from parents, teachers, and local neighborhood or business groups.

### Kick off the program

- Kick off the program with a meeting of all those that are interested. Identify ideas to educate others about safe routes to school that could be implemented throughout the year.
- Conduct an identification and review for routes that are used to walk to school. Select a time, date, and starting location for the review. End the review at the same location. Provide a copy of the Safe Route to School checklist and the map to all participants in the review.
- After the kick-off review, identify specific improvements to the routes children use to walk to school. Prioritize the improvements and work with the local school district, government, and other organizations to make them happen.

### Sustain the effort

- Organize and conduct regular events throughout the year to keep the program in the forefront, raise money and provide continuity. For example, some groups designate one day a week for walking. Others create walking school busses that are formed on a regular schedule. Some provide t-shirts for children and parents to wear at specific “walk to school” events.
- Use signs posted along the routes to school and other techniques (such as advertisements in school flyers and booths at school fairs) to let others know that the school participates in a Safe Route to School program.

## **CONDUCTING A SAFE ROUTE TO SCHOOL REVIEW**

- Ask participants to look over the checklist and the map to become familiar with the area to be reviewed.
- As each person walks, encourage them to use the boxes on the review form to check off as they encounter the potential situations. Encourage them to write notes on their review form and indicate items they think are successful as well as areas that need improvement.
- Note locations of specific concerns or successful items on the map.
- Bring a camera. Take pictures to help remember what was seen.
- When the group reconvenes, discuss the audit and findings. Take notes at the discussion.
- Formalize the findings into a report.

## SAFE ROUTE TO SCHOOL CHECKLIST

COMMENTS	RATING 1-5 where 1 is strongly disagree and 5 is strongly agree	COMMENTS/SPECIFIC AREAS THAT DESERVE NOTE
Sidewalks and pathways are clear of obstacles, in good condition, and continuous along the route.		
Sight lines from vehicles and the sidewalk are unobstructed.		
There are crosswalks and pedestrian signals at busy streets and intersections.		
Curb ramps are present at intersection crosswalks and are ADAAG compliant (refer to the Specific Design Guidelines in this document for details).		
Drivers yield to pedestrians at driveways and crosswalks.		
Secure and convenient bicycle parking is available at school.		
There is sufficient operating width for bicycles along the route.		
Curb radii are small (30' radius or less), to discourage fast vehicle cornering.		
Drivers, pedestrians, and bicyclists behave appropriately.		
Sufficient sight distances and visibility are provided, especially for pedestrians less than 5 feet tall.		
There are adequate and visible signing and pavement markings.		
There is enough lighting.		





## HOW TO SPONSOR A TRAINING COURSE

### What Should Be Researched Before Starting

#### *Is there enough interest in this topic to offer a course?*

Check with other professional organizations to learn if their members have expressed interest in this topic or if they go on personal experience and intuition.

#### *How many people should be planned for?*

This depends on the venue, the size of the community, and the amount of interest that is determined exists from the course. Other entities that have offered courses on similar topics can be asked about the number of registrants they received. Always plan for some flexibility in the numbers.

#### *Can this course provide professional education credits that would be accepted by a professional organization?*

That depends on the organizations. Contact professional organizations such as the American Planning Association, Professional Engineering Association, and other entities to determine what they require in order to accredit the course.

#### *How are other training sessions organized?*

Since it helps to learn from others, attend any type of training session to discover what could be done better and what is successful.

### What To Do First

#### *Determine the course and course content*

A training course can be a broad overview of a general topic (such as pedestrian safety) or a detailed examination of a specific topic (pedestrian safety and crosswalk design). Decide what level of interest exist for a course by asking professional organizations, sending out an email survey to professionals that might be interested in this area or, through personal experience. Once the course topic is decided, write it down and use this description to advertise the course to prospective participants.

#### *Develop a budget*

It is customary to charge for a course or class to cover expenses. Expenses could include room rental fees, speaker fees or honorariums, snacks during breaks or meals; room rental fees, audio visual equipment fees, costs associated with mailings, manhours to organize the course, staffing that may be necessary at the event and materials that may be distributed at the course. The charge should also consider that preparations will be made for people who may not attend or who may attend and not meet their commitment by paying for the class.

#### *Find a sponsor*

It is always a good idea to have a sponsor for a training course. A sponsor demonstrates to others that the training is recognized by other experts in the field as worthwhile and valuable to practicing professionals. Good ideas for sponsors include public entities, civic, professional or advocacy organizations. Sometimes sponsors will provide “seed” money (which may or may not have to be repaid) that can be used to pay room deposits, advertising costs and mailing costs and other start-up fees.

### *Find a trainer/trainers*

It is customary to pay a fee for the teacher or trainer's time and to pay for their travel expenses. Most trainers or teachers have a set fee that they charge to provide a course.

If there is no funding for a trainer, one can always ask local professionals or university professors to speak on a topic in their area of expertise. Depending on the length of the event, several local experts might be asked to speak on different topics throughout the day.

FHWA offers a three day pedestrian and bicycle training course. Contact FHWA for more information: Federal Highway Administration, 400 Seventh Street, SW, Washington, DC 20590.

Contact the ADOT Bicycle and Pedestrian Coordinator or MAG Pedestrian Planner for information on organizations that provide classes on pedestrian design and safety.

### *Pick a date*

Are there other events that would attract a similar audience, planned on the day or during the month this class is being offered?

Don't plan an event in the same week or on the same day as another event that would attract a similar audience. If possible, don't plan the event in the same month or quarter that would attract a similar audience.

Make it easy for people to come by planning the event at a time when people are not distracted by the holiday season or other religious or secular holidays.

### *Find a location*

Schools, civic buildings, community centers and hotels and resorts generally offer large meeting rooms for a nominal fee. Telephone these entities to determine availability, costs, and facility capacity.

## What to do Next

### *Spread the word*

Advertise the course on the Internet, through advertisements in professional association newsletters, on posters at universities, and at events that might attract an audience similar to one that might attend this course.

### *Organize and get ready!*

Make sure to keep track of paid and unpaid registrations. As the date of the training draws closer, reconfirm commitments, helpers, and speakers.

## Resources

*National Training Partnership*

<http://www2.edc.org/NTP/trainingdesign.htm>



## HOW TO SET UP A SPEAKERS BUREAU

### What is a Speakers Bureau?

A Speakers Bureau is a virtual “room” of people who are willing and able to speak to groups on a particular topic. By their participation in the bureau, they agree to speak to community groups, professional organizations and other entities on a particular topic, in this case, pedestrian environments and pedestrian facility design. The Bureau can consist of one to an infinite number of individuals who are willing to educate and inform others.

### How Will a Speakers Bureau Help Improve Pedestrian Design in my Community?

A Speakers Bureau is an effective and cost efficient way to reach out to a community and communicate with it. Speakers, who may be individuals that have expertise in pedestrian facility design and pedestrian environments, community members or anyone else that is engaged in the topic can take a message or an idea directly to people who have expressed an interest by their willingness to listen.

Speakers for this topic are, in effect, ambassadors for enhancing the quality of the pedestrian environment in the community.

Speakers are a walking billboard. At each event, they interact with many individuals and can help to build a constituency for effective pedestrian design.

Speakers also are a great mechanism for bringing back issues and ideas from the community that can be incorporated into the effort.

### Setting Up a Speakers Bureau

#### *Decide on the purpose of the Speakers Bureau*

Determine if the Speakers Bureau is intended to rally people to a cause, such as improving the pedestrian environment in a particular area or areas, raise awareness of pedestrian issues in general. For example, to get communities to be more vigilant about the quality of pedestrian design in their community, or to just get people thinking.

#### *Identify and Recruit Speakers*

Based on knowledge in this area, contact and identify people who are willing to speak about this topic. For most types of speaking, enthusiasm, personality and the ability to “read” and engage the audience are more important qualities than a deep down and exhaustive knowledge of the subject matter<sup>2</sup>. Place announcements that the speakers bureau is looking for speakers in local trade and professional organization publications. Remember, by setting up the bureau and organizing it, many people benefit. Most professionals will see the speakers bureau as a way to softly advertise their line of work and meet potential clients.

<sup>2</sup> <http://www.museummarketingtips.com/articles/spbureau.html>

### *Set up an organization meeting to formally outline what is expected of speakers and the workings of the Speakers Bureau*

At the meeting, have each speaker fill out a form that can be referenced when selecting a speaker for an event; days and times the speaker would be available and areas of expertise. Ask each speaker to provide a list of organizations and entities that they think might benefit from hearing a speaker. Use the organizational meeting to review how the speakers bureau will do business. This could include handing out talking points, rules on gifts and honorariums, advertising the speakers' business, how to provide follow up information, and other information. Finally, make sure that the process for setting up a speaking engagement is outlined and formalized, including confirmation, and follow up (thank you) letters.

### *Make sure the right equipment is available*

Make sure that if the speakers plan to use slides, that the event will provide a screen and projector, or that they can be provided for the speaker. Likewise, if materials are to be distributed, make sure there are enough and provide them to the speaker prior to the event.

## What To Do Next

### *Publicize the Speakers Bureau*

Use the speaker's contacts and those of the organizers to publicize the speakers bureau. Other opportunities for publicity include issuing a press release, advertising in local professional and trade publications, providing flyers at events where potential audiences may be in attendance, and leaving flyers in public places, restaurants and on community bulletin boards.

### *Keep records and lists of attendees*

If the intent of the speakers bureau is to organize or bring people together around a common issue, keep lists of people who attended meetings where the speaker was present. These lists can be used for future mailings and organizing or for information efforts. Keep abreast of community thinking by sending follow up questionnaires to attendees. "Debrief" the speaker to learn about new ideas, topics, and areas that might be of further interest.

## Resources

### *Museum Marketing Tips*

<http://museummarketingtips.com/articles/spbureau.html>

### *Reconsider*

<http://www.csdp.org/active/SPEAKERS.PDF>

### *Shriners*

<http://www.shrinershq.org/shrinersonly/prstuff/speakersbureau.html>

### *Speakers Platform Speakers Bureau*

[Http://www.speaking.com/10tips.html](http://www.speaking.com/10tips.html)



## GLOSSARY OF TERMS

*Note: Definitions used in this document are for this report only.*

**AAA:** American Automobile Association.

**ADA:** Americans with Disabilities Act.

**ADAAG:** Americans with Disabilities Act Accessibility Guidelines.

**ADOT:** Arizona Department of Transportation.

**Accessible:** In this document, to provide equal use of the built environment for all people.

**Activity Generator:** A land use or activity that draws pedestrians or from which pedestrians initiate or terminate their trips.

**Arterial Street:** A busy main street with high volumes of traffic and high speeds, usually with limited or no street side parking.

**AASHTO:** American Association of State Highway and Transportation Officials.

**Average Daily Traffic (ADT):** The quantity of vehicles that use or pass through a defined area during the time of one day.

**Bicycle Lane:** A portion of the roadway which has been designated by striping, signing, and pavement marking for the preferential or exclusive use of bicyclists.

**Buffer:** A form of visual, auditory, or land use separation through the use of structures (such as walls) or landscape materials.

**Bollard:** One of a series of objects preventing vehicles from entering an area.

**Buffer Effect:** The absorption of, or deadening effect on, auditory or visual intrusions, or an effect that causes pedestrians to shy away from the curb, building walls, window shoppers, and street furniture, which must be accounted for in the design width of a walkway.

**CPTED:** Crime Prevention Through Environmental Design. CPTED is a recognized set of design principles that can result in an environment being safer and more secure for pedestrians.

**Chicane:** A traffic calming technique where physical obstacles or barriers are placed in the street which requires drivers to slow down and drive around them.

**Choker:** Curb extensions at midblock or intersection corners that narrow a street by extending the sidewalk or widening the planting strip. They can leave the cross section with two narrow lanes or with a single lane.

**Curb:** A vertical edge, designed to deflect vehicular traffic, usually six inches in height.

**Dart-out:** A pedestrian crash type characterized by the pedestrian entering the street mid-block and being struck by a moving vehicle. It is one of the eight crash types defined by the National Highway Traffic Safety Administration that accounts for 70% of all collisions.

**Design Guideline:** A standard or principle by which to make a judgment in elements of form, color, texture, material, rhythm or pattern.

**Density:** The quantity or number of dwelling units or separate structures per unit (usually an acre).

**Destination:** The location to which a person is going.

**Driveway Crossing:** A break in the continuity of a sidewalk or walkway along a street to allow driveway access by vehicles.

**Edge:** The linear elements not used or considered as paths by the observer; the boundaries between two phases, linear breaks in continuity such as shores, railroad cuts, edges of development, walls.

**Effective Walkway Width:** The portion of the pedestrian path that is not obstructed by barriers such as utilities, slower pedestrians, people waiting, furniture, building elements or plant material.

**FHWA:** Federal Highway Administration.

**Footcandle:** A unit of illumination produced on a surface, all points of which are one (1) foot from a uniform point source of one (1) candle.

**Generator:** Entities or businesses which are the casual effect for drawing pedestrian traffic.

**Human Scale:** A scale of surroundings that is proportional to the human comfort level.

**Intensity:** In this document, the quantity of use.

**Intrinsic Sense of Security:** Feeling of being safe in an area due to a person's familiarity and sense of belonging to the area.

**Landmark:** A prominent or well-known object in a particular landscape that is easily recognized, especially one that can be used to judge one's location.

**Linkage:** A walkway connection, usually between two activity generators.

**MUTCD:** Manual on Uniform Traffic Control Devices. The MUTCD contains standards for traffic control devices that regulate, warn, and guide road users along the highways and byways in all 50 States. Traffic control devices are important because they optimize traffic performance, promote uniformity nationwide, and help improve safety by reducing the number and severity of traffic crashes.

**Node:** An open area on the walkway that is the strategic spot (point) in a community or neighborhood into which an observer can enter.

**Off-street Parking:** Parking areas which are separated from the roadway by a curb, wall, median or other means of separation.

**On-street Parking:** Parallel or diagonal parking situated adjacent to the roadway and without separation between traffic flow and parking.

**One Footcandle Lighting Level:** Assumed sufficient for public spaces, it is equal to the amount of direct light thrown by one international candle on a surface one foot away.

**Origin:** Location where a person came from.

**Pedestrian:** A person walking, jogging, or otherwise journeying on foot (including persons in wheelchairs or using other assistive devices).

**Pedestrian Area:** A location used by persons afoot, inclusive of the walkway, the roadway, and the adjacent surroundings or uses.

**Pedestrian-activated Feature:** An electronic device such as a button or lever used by the pedestrian at a traffic light to activate the crossing signal.

**Pedestrian Route:** Defined and undefined circulation patterns between origins and destinations used by the walker.

**Policy:** Any governing principle, plan, or course of action.

**Recommendation:** In this document, possible actions that can be taken by jurisdictions in the MAG region to improve the pedestrian environment.

**Recreational Pedestrian Route:** A path used for pleasure or exercise walking, often without a specific destination.

**Region:** Maricopa County limits.

**Roads of Regional Significance (RRS):** Major arterial roads in the MAG region that have regional significance.

**Shared Use Path:** A path physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within independent right-of-way. Shared use paths may be used by bicyclists, pedestrians, skaters, joggers, and other non-motorized users.

**Sidewalk:** The portion of a street or highway right-of-way designed for preferential or exclusive use by pedestrians.

**Stabilized Decomposed Granite:** A granular stone surfacing material which has been mixed with a binder and compacted to a firm surface considered ADA accessible.

**Tourist:** In this document, one who is visiting the MAG region for pleasure, culture or business. See Visitor.

**Traffic Calming:** Methods used to slow traffic and thereby reduce speed, accidents, noise, pollution, and congestion.

**Traffic:** Vehicular movement or the vehicles themselves.

**Transit:** In this document, any form of transportation used by the pedestrian other than a personal vehicle, including bicycles.

**Vehicle:** In this document, a motorized form of transportation such as an automobile, motorcycle, golf cart, bus, etc.

**View Corridor:** The surrounding area which can be viewed from a single viewpoint, usually in a linear form with a view terminus.

**Visitor:** In this document, an inhabitant of the region traveling to another part of the region, i.e. a local tourist, see Tourist.

**Walkable Commuter Route:** A pedestrian path typically originating in a residential area and terminating at a workplace. See Recreations Pedestrian Route.

**Warrant Process:** A process for determining where and when to set traffic control devices, including stop signs, street lights, etc.

**Walkway:** The pedestrian path itself, which may be undefined or defined by materials or barriers. The walkway is a channel in the pedestrian area along which pedestrians move.

**Wheelchair:** Wheelchairs include the full range of wheeled mobility devices. There is a trend away from using the term wheelchair and a movement toward the use of the term wheeled mobility device. This term includes power mobility devices and manual mobility devices and includes devices designed for adults and for children.

**Woonerf:** "Living yard"; a traffic calming technique in which there is no segregation between motorized and non-motorized traffic and in which pedestrians have priority in the whole street area.





## **BIBLIOGRAPHY**

Subject Area	Topic	Title	Authors	Link/Website	Institution	Date	Report #	Sponsor	Summary
Analysis	Capacity Analysis	CAPACITY ANALYSIS OF PEDESTRIAN AND BICYCLIST FACILITIES		<a href="http://hrcc.gov/safety/zeedbike/research/cu-rent.htm#6">http://hrcc.gov/safety/zeedbike/research/cu-rent.htm#6</a>					A compendium of data on a range of topics relating to improving bicycle and pedestrian safety. Program is sponsored by the National Highway Traffic Safety Administration (NHTSA). The primary purpose of the site is to provide State and local transportation, planning, and highway safety professionals with information on, and access to, the tools they need to implement projects and programs for pedestrian and bicyclists.
Analysis	Crash Analysis Tools	BETA TESTING OF THE PEDESTRIAN AND BICYCLE CRASH ANALYSIS TOOL	David L. Harkey and Richard D. Blomberg	<a href="http://www.nhtsa.dot.gov/people/injury/peddbimot/pead/obs-calcation-01/index.html">http://www.nhtsa.dot.gov/people/injury/peddbimot/pead/obs-calcation-01/index.html</a>	University of North Carolina Highway Safety Research Center	July 1999- July 2000		Office of Research and Traffic Records, NTS-31 National Highway Traffic Safety Administration	The Pedestrian and Bicycle Crash Analysis Tool (PBCAT) is a software product intended to assist State and local bicycle coordinators, planners, and engineers with improving walking and bicycling safety through the development and analysis of a database containing details associated with crashes between motor vehicles and pedestrians or bicyclists. One of these details is the crash type which describes the pre-crash actions of the parties involved. This product was developed by the Federal Highway Administration in cooperation with the National Highway Traffic Safety Administration. The beta version of the software was completed in November 1999. Subsequently, the product underwent a limited beta test that involved a number of practitioners. This report documents the results of the test and provides recommended enhancements for future versions of PBCAT.
Analysis	Data Sources	BICYCLE AND PEDESTRIAN DATA: NEEDS, SOURCES & GAPS	William Schwartz and Christopher Porter	<a href="http://www.fhwa.gov/publications/bicycle_and_pedestrian_data/en_tire.pdf">http://www.fhwa.gov/publications/bicycle_and_pedestrian_data/en_tire.pdf</a>	Cambridge Systematics, Inc	Jun-05	BTS00-02	U.S. Department of Transportation Bureau of Transportation Statistics	The study has the following objectives: First, to provide an inventory of existing sources of bicycle and pedestrian-related data, including the extent, quality, and limitations of these sources; Second, to identify and prioritize areas in which additional or improved data are needed; and Third, to identify and recommend opportunities for improving the quality of bicycle and pedestrian data.
Analysis	Economics	ECONOMIC VALUE OF WALKABILITY	Todd Litman	<a href="http://www.landcenter.ca/cframedoc.cfm?ID=5290">http://www.landcenter.ca/cframedoc.cfm?ID=5290</a>	Victoria Transport Policy Institute	Mar-03			This paper uses standard economic evaluation methods to investigate the value of walking (the activity) and walkability (the quality of walking conditions, including safety, comfort and convenience). Walking and walkability provide a variety of benefits, including community livability, accessibility (particularly for people who are transportation disadvantaged), transportation cost savings, public health, reduced external transportation costs, more efficient land use, economic development, and support for equity objectives. Current transportation planning practices tend to undercount and undervalue walking. More comprehensive analysis techniques, described in this paper, are likely to justify increased investment and support for walking and other nonmotorized modes of travel.
Data	Case Studies	PEDESTRIAN CROSSWALK CASE STUDIES: RICHMOND, VIRGINIA; BUFFALO, NEW YORK; STILLWATER, MINNESOTA	U.S. Department of Transportation Federal Highway Administration	<a href="http://www.fhwa.gov/publications/crosswalk_case_studies">http://www.fhwa.gov/publications/crosswalk_case_studies</a>			FHWA-RD-00-103 August 2001		This research determined the effect of crosswalk markings on driver and pedestrian behavior at unsignalized intersections. A before/after evaluation of crosswalk markings was conducted at 11 locations in 4 U.S. cities. Behavior observed included: pedestrian crossing location, vehicle speeds, driver yielding, and pedestrian crossing behavior. It was found that drivers approach a pedestrian in a crosswalk somewhat slower, and that crosswalk usage increases after markings are installed. From this study it appears that marking pedestrian crosswalks at relatively low-speed, low-volume, unsignalized intersections is a desirable practice, based on the sample of sites used in this study.
Data	Countdown Signals	THE EFFECTS OF PEDESTRIAN COUNTDOWN SIGNALS IN LAKE BUENA VISTA	Herman Huang and Charles Zegeer	<a href="http://www.dot.state.fl.us/Safety/ped_bike/h_andbooks_and_research/research/CNTR-REPT.pdf">http://www.dot.state.fl.us/Safety/ped_bike/h_andbooks_and_research/research/CNTR-REPT.pdf</a>	University of North Carolina at Chapel Hill Highway Safety Research Center			Florida Department of Transportation	The objective of this study was to evaluate the effects of countdown signals at intersections in Lake Buena Vista, Florida. A "treatment" and "control" study design was used: countdown signals at two intersections were matched with three control intersections that were similar but did not have countdown signals. The study was performed by the University of North Carolina Highway Safety Research Center.
Data	Course Materials	FHWA COURSE ON BICYCLE AND PEDESTRIAN TRANSPORTATION	US DOT Federal Highway Administration	<a href="http://www.landcenter.ca/cframedoc.cfm?ID=5611">http://www.landcenter.ca/cframedoc.cfm?ID=5611</a>	United States Department of Transportation Federal Highway Administration				Planning for bicycle and pedestrian travel is a somewhat new field of study, and yet it also involves planning and engineering techniques that have been around for many years. This course book provides the reader with current information on pedestrian and bicycle planning and design techniques, as well as practical lessons on how to increase bicycling and walking through land use practices, engineering measures, and a variety of other urban and rural design procedures. This manual can be used to train future professionals, including planners, engineers, landscape architects, and other designers, in a variety of disciplines. Emphasis is placed on the importance of developing an interdisciplinary team approach to planning and implementing bicycle and pedestrian programs, and of the role played by each profession represented in this course.

Subject Area	Topic	Title	Authors	Link/Website	Institution	Date	Report #	Sponsor	Summary
Data	Crosswalks	THE EFFECT OF CROSSWALK MARKINGS ON VEHICLE SPEEDS IN MARYLAND, VIRGINIA AND ARIZONA	Richard L. Knoblauch and Paula D. Raymond Center for Applied Research, Inc., Sponsored by the Office of Safety Research and Development	<a href="http://www.fhrc.gov/safety/pedbike/pubs/0101.pdf">http://www.fhrc.gov/safety/pedbike/pubs/0101.pdf</a>	Center for Applied Research, Inc	Aug-00	FHWA-RD-99-	Office of Safety R&D Federal Highway Administration	A before/after evaluation of pedestrian crosswalk markings was performed in Maryland, Virginia, and Arizona. Six sites that had been recently resurfaced were selected. All sites were at uncontrolled intersections with a speed limit of 56 km/h (35 mi/h). Before data were collected after the centerline and edge-line delineation was installed but before the crosswalk was installed. After data were collected after the crosswalk markings were installed. Speed data were collected under three conditions: no pedestrian present, pedestrian looking, and pedestrian not looking. All pedestrian conditions involved a staged pedestrian. The results indicate a slight reduction at most, but not all, of the sites. Overall, there was a significant reduction in speed under both the no pedestrian and the pedestrian not looking conditions. It appears that crosswalk markings make drivers on relatively low-speed arterials more cautious and more aware of pedestrians.
Data	Facilities	PEDESTRIAN FACILITIES IN SOUTH AFRICA: RESEARCH AND PRACTICE	Hubrect Ribbens	<a href="http://www.enhancementsof.org/trb%5C1538-002.pdf">http://www.enhancementsof.org/trb%5C1538-002.pdf</a>					An overview of the pedestrian accident problem in South Africa is given, and the engineering solutions implemented to improve pedestrian safety are discussed.
Data	In-Street Yield to Pedestrians	YEAR 2 FIELD EVALUATION OF EXPERIMENTAL "IN-STREET" YIELD TO PEDESTRIAN SIGNS	City Of Madison Department Of Transportation Traffic Engineering Division	<a href="http://www.walkinginfrastructure.org/pdf/r&amp;d/yfpe2sign.pdf">http://www.walkinginfrastructure.org/pdf/r&amp;d/yfpe2sign.pdf</a>	City Of Madison Department Of Transportation	Jun-05			The City of Madison Traffic Engineering Division requested and received approval in 1997 from the Federal Highway Administration to experiment with regulatory in-street "Yield to Pedestrians" signs at selected marked crosswalk locations. The experiment began in the spring of 1998. The goal of the experiment was to evaluate the effectiveness of the sign to positively change motorist behavior with respect to yielding to pedestrians at crosswalks. Three test sites, each having different geometric and pedestrian usage characteristics, were selected for the first year of the experiment. This was expanded to five sites in 1999, the second year of the experiment.
Data	No Turn on Red	THE EFFECTS OF NO TURN ON RED / YIELD TO PEDS VARIABLE MESSAGE SIGNS ON MOTORIST AND PEDESTRIAN BEHAVIOR	Herman Huang	<a href="http://www.dot.state.fl.us/Safety/ped_bike/handbooks_and_research/research/nror%20yieldtoped%20blankarch.pdf">http://www.dot.state.fl.us/Safety/ped_bike/handbooks_and_research/research/nror%20yieldtoped%20blankarch.pdf</a>	University of North Carolina at Chapel Hill Highway Safety Research Center	Nov-00		Florida Department of Transportation	This report evaluates the effects of variable message signs in Orlando, Florida, on motorist and pedestrian behavior. The signs display a NO TURN ON RED message to motorists in the right-turn lane when they have a red signal. The signs display a YIELD TO PED message to motorists in the right-turn lane when they have a green signal. The study was performed by the University of North Carolina Highway Safety Research Center.
Data	Older Pedestrians	THE MOBILITY NEEDS OF OLDER AMERICANS: IMPLICATIONS FOR TRANSPORTATION REAUTHORIZATION	Sandra Rosenbloom	<a href="http://www.mobilityneeds.org/OlderAmericans">The Mobility Needs of Older Americans</a>	Center on Urban and Metropolitan Policy				This brief challenges the easy assumptions that underlie most policy debates on providing transportation to the elderly. It discusses how an aging society adds to a range of transportation problems and argues that Congress should consider special approaches to meet the mobility and access needs of the elderly as it debates reauthorization of the Transportation Equity Act of the 21st Century (TEA-21).
Data	Pedestrian and Bicycle Safety Course	FHWA COURSE ON BICYCLE AND PEDESTRIAN TRANSPORTATION		<a href="http://safety.fhwa.dot.gov/pedbike/unwcourse/pdf/swless124.pdf">http://safety.fhwa.dot.gov/pedbike/unwcourse/pdf/swless124.pdf</a>	U.S. DOT				
Data	Pedestrian Demand	GROWING DEMAND: THE PERSPECTIVE OF THE PEDESTRIAN AND BICYCLE INFORMATION CENTER FORE SAFE WALKING AND BICYCLING		<a href="http://www.pedbikeinfo.org/pdf/fouryearsreport.pdf">http://www.pedbikeinfo.org/pdf/fouryearsreport.pdf</a>	Pedestrian and Bicycle Information Center	Apr-04		North Carolina Highway Research Center	This report looks at the demand for bicycling and walking from 1999 to 2002 through the eyes of the Pedestrian and Bicycle Information Center (PBIC). The Center was established in 1999 as a national clearinghouse on walking and bicycling for the US Department of Transportation through funding by the US Congress in the Transportation Equity Act for the 21st Century. Over the four years of our existence, we have been able to track interest in walking and bicycling through the demand we are seeing for information and through our coordination of a rapidly-growing community event called International Walk to School Day. The conclusion: walking and bicycling clearly are at the heart of what many Americans want.
Data	Planting Strips	WHAT ARE THE ADVANTAGES OF SETTING BACK THE SIDEWALK WITH A PLANTING STRIP?	John Z Welmore	<a href="http://www.pedestrians.org/lips.htm">http://www.pedestrians.org/lips.htm</a>	pedestrians.org	Feb-04		pedestrians.org.	Sidewalks can be built right at the edge of the street ..... or sidewalks can be separated from the curb by a planting strip, that is just several feet of grass between the sidewalk and the street. What a difference this green space can make!

Subject Area	Topic	Title	Authors	Link/Website	Institution	Date	Report #	Sponsor	Summary
Data	Quality of Service	QUALITY OF SERVICE FOR UNINTERRUPTED PEDESTRIAN FACILITIES IN THE 2000 HIGHWAY CAPACITY MANUAL	Joseph S. Milazzo II, PE, Nagui M. Rouphail, Ph.D., PE, Joseph E. Hummer, Ph.D., PE, D. Patrick Allen, PE	<a href="http://trc.ncsu.edu/hicahwans/download/uninterrupted.pdf">http://trc.ncsu.edu/hicahwans/download/uninterrupted.pdf</a>					The objective of the research described in this paper was to develop the basis for revised operational analysis procedures for transportation facilities with pedestrian users where flow is not interrupted by traffic control devices. This paper contains both new and revised level of service tables for analyzing various types of uninterrupted pedestrian facilities. It details the results of a review and synthesis of American and international literature as part of a Federal Highway Administration study of pedestrian and bicycle facilities conducted by North Carolina State University between 1995 and 1998. The year 2000 edition of the U.S. Highway Capacity Manual will incorporate, either directly or indirectly, most of the revised and synthesized information described in this paper. The research team recommends that the HCM revise the pedestrian walkway level of service to reflect the current literature. Proposed revisions include a decrease in the threshold for LOS A from 130 to 60 ft <sup>2</sup> /ped (12 to 5.6 m <sup>2</sup> /ped), and a change in the capacity level from 6 to 8 ft <sup>2</sup> /ped (0.6 to 0.75 m <sup>2</sup> /ped). We recommend the incorporation of a simplified walkway platoon level of service. In addition, given the different expectations of acceptable levels of platoon in transportation terminals, we recommend different level of service criteria for these facilities. We also identified a method of analyzing pedestrians on shared pedestrian-bicycle paths. Although developed in the Netherlands, the procedure has been validated on at least one trail in the United States, and is therefore recommended for inclusion in the HCM.
Data	Signing	THE EFFECTS OF INNOVATIVE PEDESTRIAN SIGNS AT UNSIGNALIZED LOCATIONS: A TALE OF THREE TREATMENTS	U.S. Department of Transportation Federal Highway Administration	<a href="http://www.walkmaginf.o.org/task_orders/11/3signs00.pdf">http://www.walkmaginf.o.org/task_orders/11/3signs00.pdf</a>	University of North Carolina Highway Safety Research Center & City of Tucson Department of Transportation	Aug-00	FHWA-RD-00-098 August 2000	Federal Highway Administration Turner-Fairbank Highway Research Center	This paper evaluates three advisory and regulatory signs re used in conjunction with marked crosswalks. The signs were used under different traffic and roadway conditions. None of the treatments had a clear effect on whether people crossed in the crosswalk. All of the signs resulted in benefits to pedestrians using the crosswalks. These devices by themselves cannot ensure that motorists will slow down and yield to pedestrians. It is essential to use these devices together with education and enforcement.
Data	Traffic Calming	THE EFFECTS OF TRAFFIC CALMING MEASURES ON PEDESTRIAN AND MOTORIST BEHAVIOR	Herman F. Huang and Michael J. Cyneck	<a href="http://www.walkmaginf.o.org/task_orders/11/Calming1.pdf">http://www.walkmaginf.o.org/task_orders/11/Calming1.pdf</a>	Highway Safety Research Center University of North Carolina and City of Phoenix Street Transportation Dept.	Aug-01	FHWA-RD-00-104	Federal Highway Administration Turner-Fairbank Highway Research Center	Traffic calming treatments may benefit pedestrians who are crossing the street by slowing down vehicle traffic, shortening crossing distances, and enhancing motorist and pedestrian visibility. The objective of this study is to evaluate the effects of selected traffic calming treatments, at both intersection and mid-block locations, on pedestrian and motorist behavior.
Data	Transit access needs assessment	RAIL STATION ACCESS: BICYCLE AND PEDESTRIAN NEEDS ASSESSMENT	North Central Texas Council of Governments Transportation Department	<a href="http://www.dfwinfo.com/trains/bikeped/accessto_rail/Access_to_Rail_Rpt1.pdf#page=5&amp;zoom=100">http://www.dfwinfo.com/trains/bikeped/accessto_rail/Access_to_Rail_Rpt1.pdf#page=5&amp;zoom=100</a>	North Central Texas Council of Governments and the Regional Transportation Council	Feb-03			Rail Station Access is key to increasing rail ridership. The completion of the first phase of the region's light and commuter rail system provides new travel opportunities for area residents, yet many barriers prevent access to the region's rail system. Local improvements such as sidewalk repair or new developments at stations can help solve regional mobility constraints by providing more transportation alternatives.
Data	Travel estimation	GUIDEBOOK ON METHODS TO ESTIMATE NON-MOTORIZED TRAVEL: AN OVERVIEW OF METHODS	WJ Schwartz, CD Porter, JC Payne, JH Suhrbier, PC Moe, WL Wilkinson III, Cambridge Systematics, Inc. Bicycle Federation of America	<a href="http://www.thrc.gov/safety/pedbiker/vol1/c contents.htm">http://www.thrc.gov/safety/pedbiker/vol1/c contents.htm</a>	Cambridge Systematics, Inc., Bicycle Federation of America	Jul-99	FHWA-RD-98-165	Federal Highway Administration	This guidebook provides a means for practitioners to better understand and estimate bicycle and pedestrian travel and to address transportation planning needs. The guidebook describes and compares the various methods that can be used to forecast non-motorized travel demand or that otherwise support the prioritization and analyses of non-motorized projects. These methods are categorized according to four major purposes: (1) demand estimation; (2) relative demand potential; (3) supply quality analysis; and (4) supporting tools and techniques. Discrete choice models, regional travel models, sketch plan methods, facility demand potential, bicycle compatibility measures, and geographic information systems are among the methods and tools described.
Design	Accessibility	AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES		<a href="http://www.access-board.gov">http://www.access-board.gov</a>		Jul-04			The U.S. Access Board will publish a revised version of ADAAG on July 26, 2004. Pedestrian facilities must comply with all relevant aspects of ADAAG, including the requirements for accessible routes, protruding objects, space allowances and reach ranges. However, the grade of a sidewalk adjacent to a roadway is permitted to mirror the grade of a roadway, even if it exceeds the grade requirements in ADAAG.

Subject Area	Topic	Title	Authors	Link/Website	Institution	Date	Report #	Sponsor	Summary
Design	Accessibility Guidelines	DRAFT GUIDELINES FOR ACCESSIBLE PUBLIC RIGHTS OF WAY	Public Rights-of-Way Access Advisory Committee	<a href="http://www.access-board.gov/rowdraft.html">http://www.access-board.gov/rowdraft.html</a>	Puget Sound Regional Council	Jun-02			The draft guidelines for public rights-of-way are being developed as a supplement to the ADA and ABA guidelines and not as a stand-alone document. As such, they will ultimately comprise a new chapter on public rights-of-way. The Board has revised recommendations from the advisory committee in preparing these draft guidelines in order to facilitate their incorporation into the ADA and ABA guidelines. The draft guidelines presented here support the new format and structure of those documents. In addition, various provisions of this draft refer to provisions in the ADA and ABA guidelines to minimize redundancy. For simplicity, the following discussion refers to the draft final ADA and ABA guidelines released in April as "ADAAG," an acronym that has wide currency.
Design	Guidelines	DESIGN GUIDELINES MANUAL— DESTINATION 2030 PHYSICAL DESIGN GUIDELINES		<a href="http://www.psrc.org/projects/growth/design_manual.pdf">http://www.psrc.org/projects/growth/design_manual.pdf</a>	Puget Sound Regional Council	Summer 2003			This Manual illustrates and describes ways to create urban places that are friendly to people. Many cities around central Puget Sound are working to encourage growth of housing and jobs in regional growth centers. This manual gives examples of good design that can help centers become more livable places where people can conveniently walk, bike, or use transit.
Design	Guidelines	GUIDELINES FOR BICYCLE AND PEDESTRIAN FACILITIES IN TEXAS	Robert J. Benz, Katherine F. Turnbull, Shawn Turner, Danise S. Hauser, Pedro S. Hurtado and Gene Hawkins, Jr.	<a href="http://safety.fhwa.dot.gov/fourthlevel/pdf/Guide.PDF">http://safety.fhwa.dot.gov/fourthlevel/pdf/Guide.PDF</a>	Texas Transportation Institute	Dec-97	FHWA/TX-97/1449-3F	Texas Department of Transportation	Guidelines for planning and designing bicycle and pedestrian facilities in Texas. An overview of the process for planning various types of bicycle and pedestrian projects is provided. The design techniques that can be used to accommodate bicycles on existing and new roadways are summarized.
Design	MUTCD	THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES CODE 23 OF FEDERAL REGULATIONS (CFR), PART 655, SUBPART F	U.S. Department of Transportation Federal Highway Administration	<a href="http://mutcd.fhwa.dot.gov/index.htm">http://mutcd.fhwa.dot.gov/index.htm</a>		Mar-02			The Manual on Uniform Traffic Control Devices, or MUTCD defines the standards used by road managers nationwide to install and maintain traffic control devices on all streets and highways. The MUTCD is published by the Federal Highway Administration (FHWA) under 23 Code of Federal Regulations (CFR) Part 655, Subpart F. Detailed drawings of the Standard Highway Signs prescribed or provided for in the Manual on Uniform Traffic Control Devices (MUTCD), 2000 Millennium Edition, have been prepared by the Office of Transportation Operations, Federal Highway Administration, U.S. Department of Transportation, for use by all traffic authorities, agencies, jurisdictions and persons involved with the fabrication, installation and maintenance of traffic signs on streets and highways in the United States. This reference provides the specifications for what Accessible Pedestrian Signals are. Accessible Pedestrian Signals provide crossing information to pedestrians with low vision and to pedestrians who are blind. While accessible pedestrian signals have value at all intersections, they are most critical at intersections with irregular crossing conditions, such as skewed or T-intersections. The MUTCD provides standardized information about how an accessible signal should be designed. It also provides guidance as to when an accessible signal should be considered.
Design	Older Driver	OLDER DRIVER HIGHWAY DESIGN HANDBOOK		<a href="http://www.fhrc.gov/safety/pubs/071.135/intro/index.htm">http://www.fhrc.gov/safety/pubs/071.135/intro/index.htm</a>			FHWA-RD-97-135		Older motorists can be expected to have problems driving given the known changes in their perceptual, cognitive, and psychomotor performances, presenting many challenges to transportation engineers, who must ensure system safety while increasing operational efficiency. This Older Driver Highway Design Handbook provides practitioners with a practical information source that links older road user characteristics to highway design, operational and traffic engineering recommendations by addressing specific roadway features. This handbook supplements existing standards and guidelines in the areas of highway geometry, operations, and traffic control devices. The information in this handbook should be of interest to highway designers, traffic engineers, and highway safety specialists involved in the design and operation of highway facilities. In addition, this handbook will be of interest to researchers concerned with issues of older road user safety and mobility.
Design	Policy	CREATING WALKABLE COMMUNITIES	Mid-America Regional Council	<a href="http://www.bikewalk.org/assets/pdf/Creating_Walkable_Communities.pdf">http://www.bikewalk.org/assets/pdf/Creating_Walkable_Communities.pdf</a>		Dec-98		Bicycle Federation of America	This report is designed to serve as a tool for local governments and concerned citizens in the Kansas City region. It presents guidelines, suggestions, and techniques on how to make communities more walkable and pedestrian-friendly. This guide is intended to help make our region a place of walkable communities. Section 1 provides background information and defines walkable communities. Section 2 covers what is involved in creating these communities and presents the elements of good pedestrian planning. The details of how to make walkable communities a reality are covered in sections 3, 4, and 5.

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Design	Policy	DESIGN GUIDANCE ACCOMMODATING BICYCLE AND PEDESTRIAN TRAVEL: A RECOMMENDED APPROACH	Drafted by the U.S. Department of Transportation with the input and assistance of public agencies, professional associations and advocacy groups	<a href="http://www.fhwa.dot.gov/advocacy/bikeped/Design.htm">http://www.fhwa.dot.gov/advocacy/bikeped/Design.htm</a>	US DOT			FHWA	Policy statement adopted by the United States Department of Transportation. USDOT hopes that public agencies, professional associations, advocacy groups, and others adopt this approach as a way of committing themselves to integrating bicycling and walking into the transportation mainstream
Design	Policy	GUIDELINES AND RECOMMENDATIONS TO ACCOMMODATE OLDER DRIVERS AND PEDESTRIANS	U.S. Department of Transportation Federal Highway Administration	<a href="http://www.fhrc.gov/humanfac/01103/coverfront.htm">Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians</a>			FHWA-RD-01-051		This project revised the scope of the Older Driver Highway Design Handbook published by the Federal Highway Administration (FHWA) in 1998. The Handbook (Highway Design Handbook for Older Drivers and Pedestrians, FHWA-RD-01-103) was updated to presenting recommendations and implementation guidelines only, plus printed and electronic materials. This Guidelines and Recommendations document incorporates new research findings and technical developments and extensive feedback from State, county, and municipal engineers who reviewed and applied recommendations from the 1998 publication. Guidance on how and when to implement the included recommendations is included, as well as codes that indicate at a glance the relationship of each recommendation to standard design manuals, including the Manual on Uniform Traffic Control Devices and the American Association of State Highway and Transportation Officials Green Book.
Design	Policy	HIGHWAY DESIGN HANDBOOK FOR OLDER DRIVERS AND PEDESTRIANS	U.S. Department of Transportation Federal Highway Administration	<a href="http://www.fhrc.gov/humanfac/01103/coverfront.htm">http://www.fhrc.gov/humanfac/01103/coverfront.htm</a>		Aug-01	FHWA-RD-01-103		This Highway Design Handbook for Older Drivers and Pedestrians provides practitioners with a practical information source that links older road user characteristics to highway design, operational, and traffic engineering recommendations by addressing specific roadway features. This Handbook supplements existing standards and guidelines in the areas of highway geometry, operations, and traffic control devices. The information in this Handbook should be of interest to highway designers, traffic engineers, and highway safety specialists involved in the design and operation of highway facilities. In addition, this Handbook will be of interest to researchers concerned with issues of older road user safety and mobility.
Design	Policy	PEDESTRIAN AND BICYCLE PLANNING: A GUIDE TO BEST PRACTICES	Todd Litman, Robin Blair, Bill Demopoulos, Nils Eddy, Anne Fritzel, Danielle Laidlaw, Heath Meadox, Katherine Forster	<a href="http://www.vpl.org/0_nmt.htm">http://www.vpl.org/0_nmt.htm</a>	Victoria Transport Institute	Oct-00			This guide covers all aspects of pedestrian and bicycle planning. It is intended for policy makers, planners and advocates who want the best current information on ways to make their communities better places for walking and cycling. It provides basic information on various planning and design concepts, and offers extensive references to help implement them. It describes general nonmotorized planning practices, how to measure and predict nonmotorized travel, how to evaluate and prioritize projects, and how to implement various programs that support nonmotorized transportation. It covers planning for paths, sidewalks, bike lanes, street improvements, road and path maintenance, road safety, personal security, universal access (including features to accommodate people with disabilities), nonmotorized traffic law enforcement, education and encouragement programs, and integration with a community's strategic plans and various other programs. There are also appendices that provide more detailed information on planning, design and evaluation.
Design	Policy	STATEWIDE BICYCLE AND PEDESTRIAN INITIATIVE: DRAFT PEDESTRIAN FACILITIES DESIGN GUIDE	Georgia Department of Transportation	<a href="http://www.dot.state.ga.us/DO/plan-prog/planning/protect%2fbicycle/peef_facilities_guide/">http://www.dot.state.ga.us/DO/plan-prog/planning/protect%2fbicycle/peef_facilities_guide/</a>		Jun-05	Transportation Research Record 1538	Committees on Pedestrians	Currently under development is the "Draft Pedestrian Facilities Guide." This Guide provides direction to design professionals, developers, municipalities and others regarding the design, construction, and maintenance of pedestrian facilities. The Guide will also aid in continuing to address the goals put forth in GDOT's 1995 Bicycle and Pedestrian Plan.
Design	Policy	CREATING SAFE BUILT ENVIRONMENTS FOR CHILDREN	Ellen Vanderslice	<a href="http://americawalks.org/resources/Creating_Safe_Built_Env.pdf">http://americawalks.org/resources/Creating_Safe_Built_Env.pdf</a>	Livable Communities	Sep-03			This three-page synopsis with footnotes was prepared for the September 2003 conference, "Developing and Sustaining Comprehensive Injury Prevention Strategies" in Los Angeles, California. What IS a safe environment? What should we be keeping our kids safe FROM? and how does promoting livable communities foster safer built environments for children?
Design	Transit interface	LINKING BICYCLE AND PEDESTRIAN FACILITIES WITH TRANSIT			National Bicycle and Walking Study	Oct-92	FHWA-PD-93-012	U.S. Department of Transportation Federal Highway Administration	This report deals with how people get to and from public transportation by bicycling or walking, a subject which has not been extensively studied in North America. Intermodal research has attracted little attention in the modally organized transportation agencies of the United States, except where large investments were at stake, such as the construction of truck-rail, airport access, and park-and-ride facilities. Pedestrian and bicycle access to transit has been taken for granted in many communities, and frequently neglected in planning, design, and operations.

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Design	Pedestrian Facilities	DESIGNING SIDEWALKS AND TRAILS FOR ACCESS PART II OF II: BEST PRACTICES DESIGN GUIDE	Kirschbaum, J.B., Axelson, P.W., Longmuir, P.E., Misspigel, K.M., Stein, J.A. and Yamada, D.A	<a href="http://www.fhwa.dot.gov/environment/side_walk2">http://www.fhwa.dot.gov/environment/side_walk2</a>	US Department of Transportation, Federal Highway Administration	2001	FHWA-EP-01-027		This document provides detailed guidance on how to plan and design accessible pedestrian facilities including sidewalks, shared use paths, and recreation trails.
Design	Policy	HOW CAN I FIND AND HELP BUILD A WALKABLE COMMUNITY?	Burden, Dan	<a href="http://www.walkable.org/">http://www.walkable.org/</a>	Walkable Communities, Inc.			Walkable Communities, Inc.	Identifies 12 important items to look at when determining if an area is walkable. Along with that there is a 12 step program (sponsored by the State of Florida) that helps communities achieve or strengthen their community's walkability.
Design Guidelines		BICYCLE AND PEDESTRIAN FACILITIES PLANNING AND DESIGN GUIDELINES	Mike Sims, Environmental Planner II	<a href="http://www.nctdco.gov/transportation/bikeped/p/landdesign/">http://www.nctdco.gov/transportation/bikeped/p/landdesign/</a>	North Central Texas Council of Governments	Sep-95		North Central Texas Council of Governments	This document contains information useful in planning and designing safe and cost-effective facilities for bicyclists and pedestrians. Standards are provided on bicycle routes, pedestrian facilities, land use planning for bicycle and pedestrian travel, and bicycle parking. The facilities and strategies described are intended to increase bicycle and pedestrian transportation opportunities by providing citizens with accessible and quality facilities.
Facilities	Accessibility	PLANNING AND FUNDING ACCESSIBLE PEDESTRIAN FACILITIES	Institute of Transportation Engineers (ITE), Federal Highway Administration's (FHWA) Bicycle and Pedestrian Office	<a href="http://www.atempo.org/Walkable_Communities/Planning_and_Funding_Accessible_Pedestrian_Facilities%20JTE.pdf">http://www.atempo.org/Walkable_Communities/Planning_and_Funding_Accessible_Pedestrian_Facilities%20JTE.pdf</a>					Summary of funding sources.
Facilities	Animated LED Eyes	USE OF ANIMATED LED 'EYES' PEDESTRIAN SIGNALS TO IMPROVE PEDESTRIAN SAFETY		<a href="http://www.dot.state.fl.us/Safety/ped_bike/handbooks_and_research/research/led_eyes.pdf">http://www.dot.state.fl.us/Safety/ped_bike/handbooks_and_research/research/led_eyes.pdf</a>	University of North Carolina Highway Safety Research Center	Jan-00		Florida Department of Transportation	The objective of this study was to evaluate the effects of countdown signals at intersections in Lake Buena Vista, Florida. A "treatment" and "control" study design was used: countdown signals at two intersections were matched with three control intersections that were similar but did not have countdown signals. The study was performed by the University of North Carolina Highway Safety Research Center.
Facilities	Crosswalks	AN EVALUATION OF FLASHING CROSSWALKS IN GAINESVILLE AND LAKELAND	Herman Huang	<a href="http://www.fhwa.gov/safety/ped_bike/handbooks_and_research/research/FLASHXW%20in%20gville%20lakeland.pdf">http://www.fhwa.gov/safety/ped_bike/handbooks_and_research/research/FLASHXW%20in%20gville%20lakeland.pdf</a>	University of North Carolina Highway Safety Research Center	Nov-00		Florida Department of Transportation	This report describes an evaluation of a flashing crosswalk systems in Gainesville, FL and Lakeland, FL. The evaluation was conducted by the University of North Carolina Highway Safety Research Center (HSRC) during 1999.
Facilities	Crosswalks	AN EVALUATION OF HIGH-VISIBILITY CROSSWALK TREATMENTS—CLEARWATER, FLORIDA	Marsha Nitzburg and Richard L. Knoblauch	<a href="http://www.fhrc.gov/safety/pedbike/pub%20105.pdf">http://www.fhrc.gov/safety/pedbike/pub%20105.pdf</a>	Center for Applied Research, Inc	Aug-01	FHWA-RD-00-105	Office of Safety R&D Federal Highway Administration	A novel overhead illuminated crosswalk sign and high-visibility ladder style crosswalk were evaluated in Clearwater, Florida. Using an experimental/control design, the effect of the novel treatments on driver and pedestrian behavior was determined. A significant 30 percent to 40 percent increase in daytime driver yielding behavior was found. A smaller (8 percent) and statistically insignificant increase in nighttime driver yielding behavior was observed. A large (35 percent) increase in crosswalk usage by pedestrians was noted along with no change in pedestrian overconfidence, running, or conflicts. It was concluded that the high-visibility crosswalk treatments had a positive effect on pedestrian and driver behavior on the relatively narrow low-speed crossings that were studied. Additional work is needed to determine if they will also have a desirable effect on wider, higher-speed roadways.

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Facilities	Crosswalks	MAKING CROSSWALKS SAFER FOR PEDESTRIANS - APPLICATION OF A MULTIDISCIPLINARY APPROACH TO IMPROVE PEDESTRIAN SAFETY AT CROSSWALKS IN ST. PETERSBURG, FLORIDA		<a href="http://www.dot.state.fl.us/Safety/peed_bike/handbooks_and_research/research/peedwalk.pdf">http://www.dot.state.fl.us/Safety/peed_bike/handbooks_and_research/research/peedwalk.pdf</a>	Center for Urban Transportation Research College of Engineering University of South Florida	Jul-00		Florida Department of Transportation State Safety Office	This report provides an overview of the multidisciplinary program implemented in St. Petersburg, Florida to improve pedestrian safety. The program aimed to increase motorist yielding to pedestrians in crosswalks from single digits to 70 percent and reduce pedestrian-motor vehicle conflicts in crosswalks by 50 percent. Another program goal was to increase pedestrians' feelings of comfort and safety while crossing the street. The report documented the steps involved in assessing pedestrian safety in the community, prioritizing and selecting countermeasures to improve pedestrian safety, implementing engineering, education, and enforcement interventions, and evaluating the effectiveness of the program.
Facilities	Crosswalks	PEDESTRIAN CROSSWALKS - HOW SAFE ARE THEY?		<a href="http://www.dot.state.az.us/ROADS/Traffic/walk.htm#six">http://www.dot.state.az.us/ROADS/Traffic/walk.htm#six</a>	Arizona Department of Transportation	Sep-00			The Arizona Department of Transportation's crosswalk policy is based on research conducted over a seven-year period by the City of San Diego. The San Diego approach to evaluating crosswalk needs, which resulted from that research, has resulted in that city being consistently ranked as the safest pedestrian city in the nation. The San Diego study showed traffic engineers that nearly six pedestrian accidents were occurring in marked crosswalks for every one mishap in unmarked crosswalks (those unpainted crosswalks that exist by State law at all intersections). When this ratio was adjusted in terms of relative crosswalk usage, there was still an impressive 2 to 1 difference in accidents.
Facilities	Grade Separation	GUIDELINES FOR TRAFFIC FACILITIES PART 4.3 GRADE SEPARATED PEDESTRIAN FACILITIES	Road and Traffic Authority New South Wales	<a href="http://www.rta.nsw.gov.au/TrafficInformation/downloads/gradeSeparatedPedestrianFacilities.d11.html">http://www.rta.nsw.gov.au/TrafficInformation/downloads/gradeSeparatedPedestrianFacilities.d11.html</a>		Jul-87			This guideline provides numerical and other selection criteria which apply for the evaluation of CSFPs on any existing road. Having met or exceeded the criteria it is possible that the provision of the facility will not proceed immediately but more likely that an in-depth investigation of a CSFP or an alternative measure is needed. If the criteria are not met it is unlikely that any further investigations would be necessary.
Facilities	Lightguard	AN EVALUATION OF THE LIGHTGUARD- PEDESTRIAN CROSSWALK WARNING SYSTEM	Herman Huang, Ronald Hughes, Charles Zegeer and Marsha Nitzburg	<a href="http://www.dot.state.fl.us/Safety/peed_bike/handbooks_and_research/research/gresch.pdf">http://www.dot.state.fl.us/Safety/peed_bike/handbooks_and_research/research/gresch.pdf</a>	University of North Carolina Highway Safety Research Center, Center for Applied	Jun-99		Florida Department of Transportation Safety Office	This report describes an evaluation of a prototype installation of the LightGuard™ Pedestrian Crosswalk Warning System in Orlando, FL. The evaluation was conducted by the University of North Carolina Highway Safety Research Center (HSRC) with the assistance of the Center for Applied Research (CAR) during 1997 and 1998.
Facilities	Pedestrian Detection Signals	EVALUATION OF AUTOMATED PEDESTRIAN DETECTION AT SIGNALIZED INTERSECTIONS	Ronald Hughes, Herman Huang, Charles Zegeer, and Michael Cynectki	<a href="http://www.fhrc.gov/safety/peebike/pub/00-097.pdf">http://www.fhrc.gov/safety/peebike/pub/00-097.pdf</a>	University of North Carolina Highway Safety Research Center, City of Phoenix	Aug-01	FHWA-RD-00-097	Federal Highway Administration Turner-Fairbank Highway Research Center	The objective of the present study was to evaluate whether automated pedestrian detectors, when used in conjunction with standard pedestrian push buttons, would result in fewer overall pedestrian-vehicle conflicts and fewer inappropriate crossings (i.e., beginning to cross during the Don't Walk signal). The results of this study indicated a significant reduction in vehicle-pedestrian conflicts as well as a reduction in the number of pedestrians beginning to cross during the Don't Walk signal. Detailed field testing of the microwave equipment in Phoenix revealed that fine tuning of the detection zone is still needed to reduce the number of false calls and missed calls.
Facilities	Push Buttons	AN EVALUATION OF ILLUMINATED PEDESTRIAN PUSH BUTTONS IN WINDSOR, ONTARIO	Herman F. Huang and Charles V. Zegeer	<a href="http://www.fhrc.gov/safety/peebike/pub/0102.pdf">http://www.fhrc.gov/safety/peebike/pub/0102.pdf</a>	University of North Carolina Highway Safety Research Center	Aug-01	FHWA-RD-00-102	Federal Highway Administration Turner-Fairbank Highway Research Center	At many intersections, pedestrians must push buttons to activate the Walk phase. However, they often do not know whether the button has been pressed and whether it is functional. If the Walk phase does not appear soon after the button has been pressed, they may believe that the button does not work and start crossing early, while the steady Don't Walk is still being displayed. When a pedestrian presses an illuminated push button, a light near the button turns on, indicating that the Walk phase has been activated and will appear. The objective of this study is to evaluate the effects of illuminated push buttons on pedestrian behavior.
Facilities	Reference Guide	PEDESTRIAN FACILITIES REFERENCE GUIDE	National Center for Bicycling and Walking	<a href="http://www.bikewalk.org/walking/design_guide/pedestrian_design_guide_index.htm">http://www.bikewalk.org/walking/design_guide/pedestrian_design_guide_index.htm</a>					On line guide to design and implementation of walkways, intersections, curb ramps, extensions and radii, signal timing and push buttons, signing, marking, amenities, street reconfiguration, bridges, traffic calming, maintenance and other pedestrian facility, design and education areas.
Facilities	Roundabouts	PEDESTRIAN ACCESS TO MODERN ROUNDABOUTS: DESIGN AND OPERATIONAL ISSUES FOR PEDESTRIANS WHO ARE BLIND		<a href="http://www.access-board.gov/publications/roundabouts/bulletin.htm">http://www.access-board.gov/publications/roundabouts/bulletin.htm</a>	The Access Board	Aug-03			Summarizes orientation and mobility techniques used by pedestrians who are blind in traveling independently across streets; highlights key differences between roundabouts and traditional intersections with respect to these techniques; suggests approaches that may improve the accessibility of roundabouts to blind pedestrians; and encourages transportation engineers and planners to implement and test design features to improve roundabout accessibility.

Subject Area	Topic	Title	Authors	Link/Website	Institution	Date	Report #	Sponsor	Summary
Facilities	Shoulders	AN EVALUATION OF ROAD SHOULDERS AS A BICYCLE AND PEDESTRIAN FACILITY	William W. Hunter	<a href="http://www.dot.state.fl.us/safety/ped_bike/h_andbooks_and_research/research/redstudy.pdf">http://www.dot.state.fl.us/safety/ped_bike/h_andbooks_and_research/research/redstudy.pdf</a>	University of North Carolina Highway Safety Research Center	Jul-98		FLORIDA DEPARTMENT OF TRANSPORTATION BICYCLE/PEDESTRIAN SAFETY	A scenic road in Lake County, Florida, is the subject of this evaluation. The evaluation was conducted by the University of North Carolina Highway Safety Research Center (HSRC). In the early 1990s the road was scheduled to receive shoulders. This was opposed by the residents who feared that speeds would increase with the addition of shoulders. The Florida DOT suggested that painting the shoulders might be a treatment that could be adapted from Europe. The evaluation examined several items: speed data, whether the shoulder was used by bicyclists, lateral positioning of bicyclists being passed by motor vehicles, and the amount and severity of vehicular encroachment into opposing travel lane.
Facilities	User's Guide	PEDESTRIAN FACILITIES USERS GUIDE — PROVIDING SAFETY AND MOBILITY	U.S. Department of Transportation Federal Highway Administration March 2002	<a href="#">Pedestrian Facilities Users Guide</a>			FHWA-RD-01-102		The purpose of this guide is to provide information on how to identify the safety and mobility needs of pedestrians within roadway rights-of-way. The guide provides guidance on how to select pedestrian safety improvements to address specific crash problems.
Facilities:	Signals	ACCESSIBLE PEDESTRIAN SIGNALS: SYNTHESIS AND GUIDE TO BEST PRACTICE	J.M. Barlow, B.L. Benzen, Lee Tabor	<a href="http://www.walkinginfo.org/aps/home.cfm">http://www.walkinginfo.org/aps/home.cfm</a>		Accessed 4-05-04		American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration. Conducted in the National Cooperative Highway Research Program, which is administered by the Transportation Research Board of the National Research Council.	This online provides background information on how pedestrians who are blind or visually impaired cross streets, and how Accessible Pedestrian Signals assist this process. This document provides guidance on how and when to install accessible pedestrian signals. It also summarizes the relevant information from the MUTCD and the Draft Guidelines for Accessible Public Rights-of-way.
Facilities	Accessibility	ADA DRAFT PUBLIC RIGHTS-OF-WAY ACCESSIBILITY GUIDELINES		<a href="http://www.access-board.gov/ovw/draft.htm">http://www.access-board.gov/ovw/draft.htm</a>	U.S. Access Board	Jun-02		U.S. Access Board	These guidelines are under revision as a result of comments received on the first draft. Once these comments are addressed, a second draft will be provided for comment.
Facilities	Roundabouts	ROUNDBABOUTS: AN INFORMATIONAL GUIDE		<a href="#">Roundabouts</a>		Jun-00	FHWA-RD-00-67		This guide provides information and guidance on roundabouts, resulting in designs that are suitable for a variety of typical conditions in the United States. The scope of this guide is to provide general information, planning techniques, evaluation procedures for assessing operational and safety performance, and design guidelines for roundabouts. The relative safety advantages of roundabout intersections diminish at high traffic flows, particularly with regard to pedestrians and bicyclists. The advantages of larger roundabouts are their higher capacities that may make them attractive alternatives at sites with high traffic volumes. More intricate design is required to ensure adequate operational and safety performance.
Facilities	Pedestrian Facilities	AASHTO GUIDE TO THE DEVELOPMENT OF PEDESTRIAN FACILITIES	American Association of State Highway and Transportation Officials			Fall 2004		National Cooperative Highway Research Program	The National Cooperative Highway Research Program sponsored the development of this Guide, which is intended to supplement the AASHTO Greenbooks' treatment of pedestrian facilities. This document was developed with the input of national experts on accessible pedestrian design. The review process for the AASHTO Pedestrian Guide is complete and the document is expected to be published in the fall 2004.

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Health	Older Pedestrian	STEPPING OUT: MATURE ADULTS BE HEALTHY, WALK SAFELY	National Highway Transportation Safety Administration	<a href="http://www.nhtsa.dot.gov/people/injury/old_driver/SteppingOut/pdf/1version/stepping_out.pdf">http://www.nhtsa.dot.gov/people/injury/old_driver/SteppingOut/pdf/1version/stepping_out.pdf</a>		Jul-04		U.S. Department of Transportation	Stepping Out was developed to fill the need for pedestrian safety materials for older adults, age 65 and above. This booklet is not just a compilation of safety information for older people. The intent is to promote safe walking as an easy way to maintain ones' health.
Health	Policy	PROMOTING SAFE WALKING AND CYCLING TO IMPROVE PUBLIC HEALTH: LESSONS FROM THE NETHERLANDS AND GERMANY	John Pucher, PhD, and Lewis Dijkstra, PhD	<a href="http://www.vpi.org/ΔJPpucher.pdf">http://www.vpi.org/ΔJPpucher.pdf</a>	Bloustein School of Planning and Public Policy Rutgers University	Sep-03		American Journal of Public Health,	Examination of the public health consequences of unsafe and inconvenient walking and bicycling conditions in American cities and suggest improvements based on successful policies in The Netherlands and Germany
Implementation	Advocacy	INTRODUCTION TO PEDESTRIAN ADVOCACY	AmericaWALKS	<a href="http://americawalks.org/PedAdv.pdf">http://americawalks.org/PedAdv.pdf</a>					This America Walks document will provide you with an overview of the importance of walking that you can share with friends, neighbors, and community leaders.
Implementation	Advocacy	TOOLBOX FOR PEDESTRIAN ADVOCATES	AmericaWALKS	<a href="http://americawalks.org/resources/toolbox/index.htm">http://americawalks.org/resources/toolbox/index.htm</a>					Want to know the basics of starting a grassroots group? Want to see examples of newsletters and brochures from other groups? You'll find what you need in the toolkit for new groups .
Implementation	Checklist	WALK TO SCHOOL WALKABILITY CHECKLIST		<a href="http://www.walktoschool.org/">http://www.walktoschool.org/</a>	walktoschool.org			Partnership for a Walkable America, Pedestrian and Bicycle Research Center, EPA, USDOT	Checklist to determine how walkable your route to school/community is.
Implementation	Checklist	WALKABILITY CHECKLIST		<a href="http://www.nhtsa.dot.gov/people/outreach/safesabz/OPhammer/11epsbv/walk1.html">http://www.nhtsa.dot.gov/people/outreach/safesabz/OPhammer/11epsbv/walk1.html</a>	National Child Passenger Safety Week			Partnership for a Walkable America	Walkability Checklist
Implementation	Checklist	WALKABILITY CHECKLIST		<a href="http://www.nsc.org/walk/wkcheck.htm">http://www.nsc.org/walk/wkcheck.htm</a>	Partnership for a Walkable America			Partnership for a Walkable America	Walkability Checklist
Safety	Accident	A STUDY OF FATAL PEDESTRIAN CRASHES IN FLORIDA	Michael R. Baltes,	<a href="http://safety.fhwa.dot.gov/fourthlevel/pdf/0861.pdf">http://safety.fhwa.dot.gov/fourthlevel/pdf/0861.pdf</a>	Center for Urban Transportation Research (CURT) University of South Florida, Tampa				In this study, trained researchers assumed roles as pedestrians in which they began bravely crossing just prior to motorists approaching the intersection. Katz et al. found that motorists were more likely to reduce their speed or stop for pedestrians more often when the motorist's approach speed was low; the crossing took place at a marked crosswalk; there was a relatively long distance between the motorist and the pedestrian's point of entry into the crosswalk; a group of pedestrians, rather than a lone pedestrian, attempted to cross; the pedestrian did not look at the approaching vehicle; and female or older motorists were most likely behind the wheel
Safety	Accident	AN ANALYSIS BASED ON HOSPITAL EMERGENCY DEPARTMENT DATA	David A. Noyce, Ph.D., P. E., Janet M. Barlow, C.O.M.S	<a href="http://www.access-board.gov/research&amp;training/APS/report.htm">http://www.access-board.gov/research&amp;training/APS/report.htm</a>				U.S. Access Board	The primary objective of this research was to provide detailed accessible pedestrian signal (APS) product information specifically focused on the interfacing of APS devices and traffic signal controllers. Information on the various traffic signal controllers used today is also provided. The information is intended for traffic engineers, traffic signal technicians, and others who are implementing APS technologies. This report addresses the following information: United States and foreign APS technologies, including those that provide mapping, speech, and location features for blind pedestrians; Traffic signal controller/APS interfaces, including wiring and power requirements and interaction with conflict monitoring technology; Lessons learned from existing installations; and United States traffic signal controller technologies.

Subject Area	Topic	Title	Authors	Link/Website	Institution	Date	Report #	Sponsor	Summary
Safety	Crash	AN ANALYSIS OF FACTORS CONTRIBUTING TO *WALKING ALONG ROADWAY* CRASHES: RESEARCH STUDY AND GUIDELINES FOR SIDEWALKS AND WALKWAYS	Patrick J. McMahon, Charles V. Zegler, Chandler Duncan, Richard L. Knoblauch, J. Richard Stewart, and Asad J. Khattak	<a href="http://www.walkingalong.org/pdf/r&amp;d/Sidewa lkReport.pdf">http://www.walkingalong.org/pdf/r&amp;d/Sidewa lkReport.pdf</a>	University of North Carolina Highway Safety Research Center	Jun-05	FHWA-RD-01-101		There are a variety of factors widely acknowledged to have an impact on the risk of pedestrian/motor vehicle crashes. The factors that have been most extensively researched are the geometric characteristics of the road, including the presence of sidewalks. However, in relevant epidemiological research, factors related to demographics and neighborhood characteristics have been alluded to, but not sufficiently researched. This study uses a case-control methodology and applies conditional and binary logistic models to determine the effects of cross-sectional roadway design attributes and socioeconomic and other census block group data on the likelihood that a site is a crash site. A total of 47 crash sites and 94 comparison sites are analyzed. Physical design factors found to be associated with a significantly higher likelihood of being a crash site are higher traffic volume, higher speed limit, the lack of wide grassy walkable areas, and the absence of sidewalks. When these roadway factors are controlled for, non-geometric factors associated with a significantly higher likelihood of being a crash site are high levels of u
Safety	Children	STOP SIGN VIOLATIONS PUT CHILD PEDESTRIANS AT RISK: A NATIONAL SURVEY OF MOTORIST BEHAVIOR AT STOP SIGNS IN SCHOOL ZONES AND RESIDENTIAL AREAS	National Safe Kids Campaign	<a href="http://www.safekids.org/content/document/3/Stop_Sign_Violation_s_Put_Child_Pedestria ns_At_Risk_-_full_report.pdf">http://www.safekids.org/content/document/3/Stop_Sign_Violation s_Put_Child_Pedestria ns_At_Risk_-_full_report.pdf</a>	National Safe Kids Campaign	Oct-03		National Safe Kids Campaign and FEDEX Express	New research unveiled today by the National SAFE KIDS Campaign and FedEx Express revealed that nearly half of motorists are not stopping at stop signs near school zones and in residential areas across the nation, potentially endangering children as they travel to and from school each day.
Safety	Crosswalks	SAFETY EFFECTS OF MARKED VS. UNMARKED CROSSWALKS AT UNCONTROLLED LOCATIONS: EXECUTIVE SUMMARY AND RECOMMENDED GUIDELINES	Charles V. Zegler, J. Richard Stewart, Herman H. Huang, and Peter A. Logerwey	<a href="http://www.walkingalong.org/pdf/r&amp;d/crosswalk_021302.pdf">http://www.walkingalong.org/pdf/r&amp;d/crosswalk_021302.pdf</a>	University of North Carolina Highway Safety Research Center	Mar-01	FHWA-RD-01-075	Office of Safety Research and Development Federal Highway Administration	Pedestrians are legitimate users of the transportation system, and they should, therefore, be able to use this system safely. Pedestrian needs in crossing streets should be identified, and appropriate solutions should be selected to improve pedestrian safety and access. Deciding where to mark crosswalks is only one consideration in meeting that objective. This study involved an analysis of 5 years of pedestrian crashes at 1,000 marked crosswalks and 1,000 matched unmarked comparison sites. All sites in this study had no traffic signal or stop sign on the approaches. Detailed data were collected on traffic volume, pedestrian exposure, number of lanes, median type, speed limit, and other site variables. Poisson and negative binomial regressive models were used.
Safety	Fatalities	PEDESTRIAN ROADWAY FATALITIES	Shankar, Umesh	<a href="http://www.and.nhtsa.dot.gov/pdf/30/NCSA/Rpts/2003/809-456.pdf">http://www.and.nhtsa.dot.gov/pdf/30/NCSA/Rpts/2003/809-456.pdf</a>	Mathematical Analysis Division, National Center for Statistics and Analysis National Highway Traffic Safety Administration	Apr-03	DOT HS 809 456	Mathematical Analysis Division, National Center for Statistics and Highway Traffic Safety Administration	The objective of this study by the National Center for Statistics and Analysis (NCSA) was to examine the pedestrian fatalities in motor vehicle crashes. Data was analyzed for trends using the 1998 through 2001 NCSA's Fatality Analysis Reporting System (FARS). Rates are calculated based on the US resident population data from the Census Bureau. Almost 175,000 pedestrians died in all motor vehicle crashes with more than 162,000 pedestrians killed in single vehicle crashes between 1975 and 2000. Pedestrian fatalities from all crashes reached a low of 4,763 fatalities in 2000. In 2001, pedestrian fatalities slightly increased to 4,882. However, in 2001, pedestrian fatalities accounted for about 12 percent of all fatalities and 85 percent of all non-occupant fatalities in motor vehicle crashes. Pedestrian fatalities in single vehicle crashes accounted for over 90 percent of the pedestrian fatalities from all fatal motor vehicle crashes. With such a high percentage of pedestrian fatalities from single vehicle crashes, this report was written to provide insight into the possible causes for these pedestrian fatalities.
Safety	Injuries	LITERATURE REVIEW ON VEHICLE TRAVEL SPEEDS AND PEDESTRIAN INJURIES	W.A. Leaf and D.F. Preusser	<a href="http://www.nhtsa.dot.gov/people/injury/res search/pub/H580901_2.html">http://www.nhtsa.dot.gov/people/injury/res search/pub/H580901_2.html</a>	Preusser Research Group, Inc	Oct-99	DOT HS 809 021	U. S. Department of Transportation National Highway Traffic Safety Administration	The relationship between vehicle travel speeds and resulting pedestrian injury was reviewed in the literature and in existing data sets. Results indicated that higher vehicle speeds are strongly associated with both a greater likelihood of pedestrian crash occurrence and more serious resulting pedestrian injury. It was estimated that only 5 percent of pedestrians would die when struck by a vehicle traveling at 20 miles per hour or less. This compares with fatality rates of 40, 80, and nearly 100 percent for striking speeds of 30, 40, and 50 miles per hour or more respectively. Reductions in vehicle travel speeds can be achieved through lowered speed limits, police enforcement of speed limits, and associated public information. More long-lasting speed reductions in neighborhoods where vehicles and pedestrians commonly share the roadway can be achieved through engineering approaches generally known as traffic calming. Countermeasures include road humps, roundabouts, other horizontal traffic deflections (e.g., chicanes), and increased use of stop signs.

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Safety	Injury	INJURIES TO PEDESTRIANS AND BICYCLISTS		<a href="http://www.fhrc.gov/safety/pedbike/research/99078/99-078.htm">http://www.fhrc.gov/safety/pedbike/research/99078/99-078.htm</a>	National Centers for Injury Prevention and Control	Site accessed 4-12-04	FHWA-RD-99-078		US DOT data on crash statistics has relied almost entirely on State motor vehicle crash data as their primary source of information on events causing injury to pedestrians and bicyclists. This data is not necessarily representative of the extent of accidents as they are limited almost entirely to motor vehicle-related events that occur on public roadways. Specifically, they exclude: (1) many bicycle-motor vehicle and pedestrian-motor vehicle crashes that occur in non-roadway locations such as parking lots, driveways, and sidewalks, and (2) bicyclist and pedestrian falls or other non-collision events that do not involve a motor vehicle, regardless of whether they occur on a roadway or in a non-roadway location.
Safety	Injury Prevention	PEDESTRIAN INJURY PREVENTION FACT SHEET		<a href="http://www.cdc.gov/ncepc/factsheets/pedes.htm">http://www.cdc.gov/ncepc/factsheets/pedes.htm</a>					Fact sheet on prevention of pedestrian injuries.
Safety	Lessons Learned	MAKING WALKING AND CYCLING SAFER: LESSONS FROM EUROPE	John Pucher and Lewis Dijkstra	<a href="http://www.wpi.org/ajuchetta.pdf">http://www.wpi.org/ajuchetta.pdf</a>	Department of Urban Planning Rutgers University, Bloustein School	Summer 2000		Transportation Quarterly	The neglect of pedestrian and bicycling safety in the United States has made these modes dangerous ways of getting around. Pedestrian fatalities are 36 times higher than car occupant fatalities per km traveled, and bicycling fatalities are 11 times higher than car occupant fatalities per km. Walking and bicycling can be made quite safe, however, as clearly shown by the much lower fatality rates in The Netherlands and Germany. Pedestrian fatalities per billion km walked are less than a tenth as high as in the United States, and bicyclist fatalities per billion km cycled are only a fourth as high. The Netherlands and Germany have long recognized the importance of pedestrian and bicyclist safety. Over the past two decades, these countries have undertaken a wide range of measures to improve safety: better facilities for walking and bicycling; urban design sensitive to the needs of non-motorists; traffic calming of residential neighborhoods; restrictions on motor vehicle use in cities; rigorous traffic education of both motorists and non-motorists; and strict enforcement of traffic regulations protecting pedestrians and bicyclists.
Safety	Pedestrian Zones	ZONE GUIDE FOR PEDESTRIAN SAFETY		<a href="http://safety.fhwa.dot.gov/fourthlevel/pdf/fech3.pdf">http://safety.fhwa.dot.gov/fourthlevel/pdf/fech3.pdf</a>		May-98	181	National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA)	Research study to apply the safety zone concept to reducing crashes involving older (65+) adult pedestrians. That study, released earlier this year, developed procedures for defining pedestrian safety zones, and developed, implemented, and evaluated a countermeasure program in Phoenix, Arizona and Chicago, Illinois (see Traffic Tech 174, March 1998). Older pedestrian crashes were reduced by more than 46 percent in target zones. As a second part of the study, Dunlap and Associates prepared a concise how-to document, Zone Guide for Pedestrian Safety. The Guide describes step-by-step procedures officials can use in applying the zone process to their community's pedestrian safety problems.
Safety	Policy	PEDESTRIAN SAFETY HANDBOOK	Debbie Grubb, Ed.	<a href="http://www.ach.org/pedestrian/pht2a.html">http://www.ach.org/pedestrian/pht2a.html</a>	The American Council of the Blind	Apr-00			A Handbook for Advocates Dedicated to Improving the pedestrian environment Guaranteeing people who are blind or visually impaired Access to Intersection Identification and Traffic Control Information
Safety	Policy	TRAFFIC SAFETY AND OLDER AMERICANS: MAKING ROADS SAFER FOR MOTORISTS	The Road Information Program (TRIP)	<a href="http://safety.fhwa.gov/olderamericans">http://safety.fhwa.gov/olderamericans</a>		Oct-00			Significant safety improvements to our nation's roads will help preserve and extend the personal mobility these older drivers have enjoyed throughout their lives. This report summarizes demographic data highlighting the need to address older motorists' needs for improved safety. The report reiterates the recommendations of the FHWA report, "Older Driver Highway Design Handbook."
Safety	School	SAFE ROUTES TO SCHOOL: GETTING STARTED WITH SR2S	Bruce Appleyard	<a href="http://www.lakewalk.org/safe_routes_to_school/SR2S_introduction.htm">http://www.lakewalk.org/safe_routes_to_school/SR2S_introduction.htm</a>	National Center for Bicycling and Walking				Internet guide including concept and history, getting started, activities, case studies, funding, planning, data, legislation and resources sections for Safe Route to School programs.
Safety	Teaching Materials	PEDESTRIAN SAFETY ROADSHOW		<a href="http://safety.fhwa.dot.gov/roadshow/walk/">http://safety.fhwa.dot.gov/roadshow/walk/</a>					This program is not just a 4-hour roadshow. It combines other resources that have been developed to help communities identify and address their pedestrian safety concerns. These resources include: WALK!, a 12-minute video that address these issues; Pedestrian Safety Resource Catalog, an overview of the process involved in a community pedestrian program and an annotated listing of the technical resources that are available from the Department of Transportation; a Local Sponsor's guide, a step-by-step guide to host a Pedestrian Safety roadshow; Wanted - Walkable Communities brochure that describes the Roadshow process; and the "Tool Box", which is being developed, comprising a set of information/documents on pedestrian facilities and community building.

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Safety	Case Studies	SAFER PLACES: THE PLANNING SYSTEM AND CRIME PREVENTION	Planning Directorate, London UK	<a href="http://www.odpm.gov.uk/stellent/groups/odpm_planning/docs/documents/page/odpm_plan_028449.pdf">http://www.odpm.gov.uk/stellent/groups/odpm_planning/docs/documents/page/odpm_plan_028449.pdf</a>	Office of the Deputy Prime Minister, London UK	Apr-04			Lists seven attributes of safer places. As well as physical protection by means of secure doors, locks and alarms, they cover well-defined routes, good surveillance and the promotion of a sense of ownership. Practical crime prevention measures are given in 17 case studies, which cover housing developments, a town centre, an industrial estate, a college, a car park, a bus station and a park.
Safety	Policy Project	MEAN STREETS 2002	Ernst, Michelle and McCann, Barbara	<a href="http://www.transact.org/rep_of">www.transact.org/rep_of</a>	Surfact Transportation Policy Project	2002			Data was collected on pedestrian fatalities and injuries nationwide. A Pedestrian Danger Index (PDI) was calculated for each state. Looks at reasons why communities are becoming more dangerous to walk in, how this relates to federal spending on pedestrian facilities, and the correlation between walking and health.
Health		QUANTIFYING THE COST OF PHYSICAL INACTIVITY	Active Living Leadership	<a href="http://www.activelivingleadership.org/costc.html">http://www.activelivingleadership.org/costc.html</a>				Robert Wood Johnson Foundation	Active Living Leadership is a website developed to support government leaders as they create and promote policies, programs and places that enable active living to improve the health, well-being and vitality of communities